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VICTORIA – AUSTRALIA

VOL. XXXI PART 11

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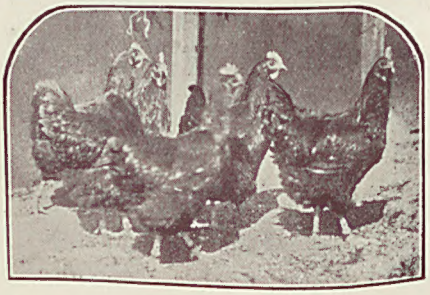

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Issued under the direction of the Hon. J. Allan, M.L.A., Minister of Agriculture.

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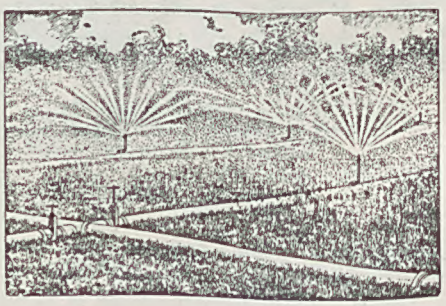

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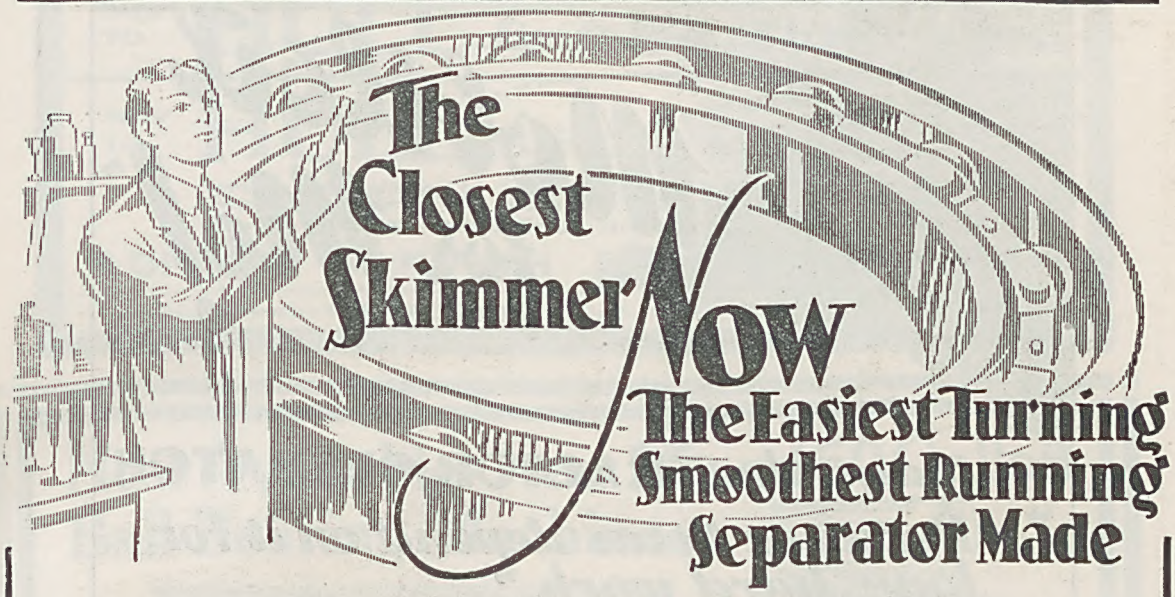

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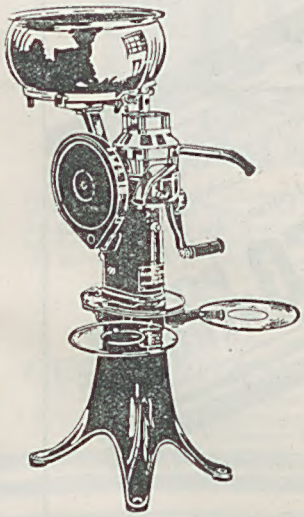

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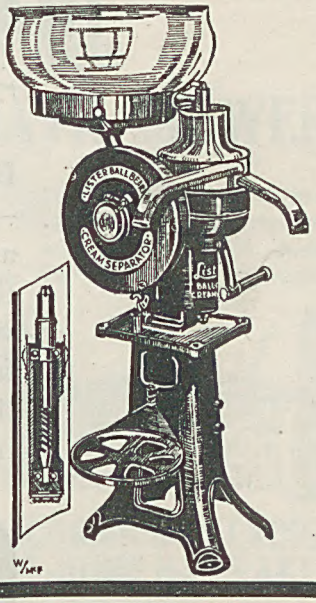

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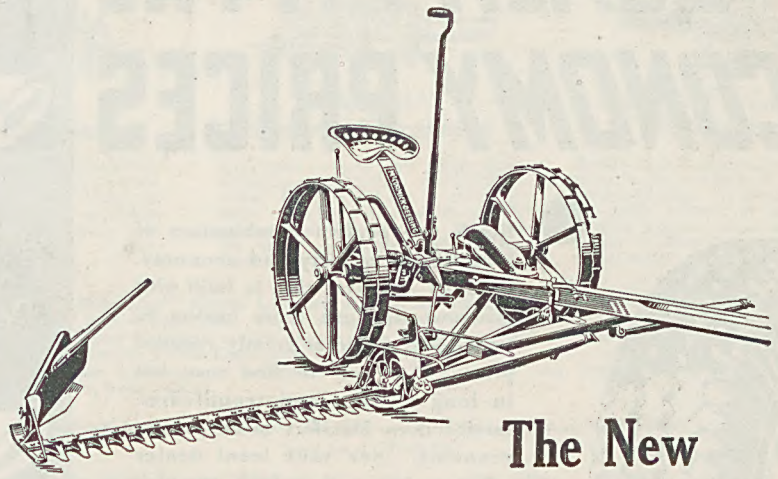

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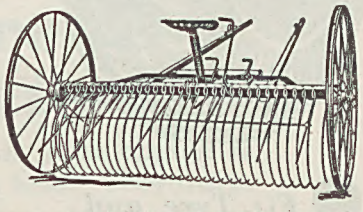

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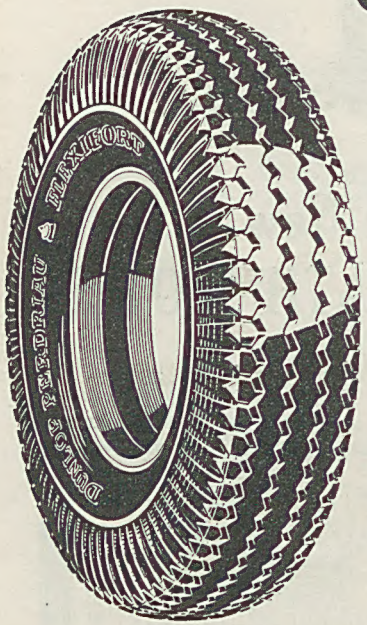

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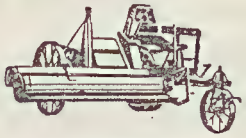

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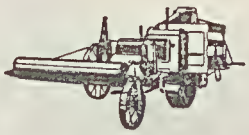

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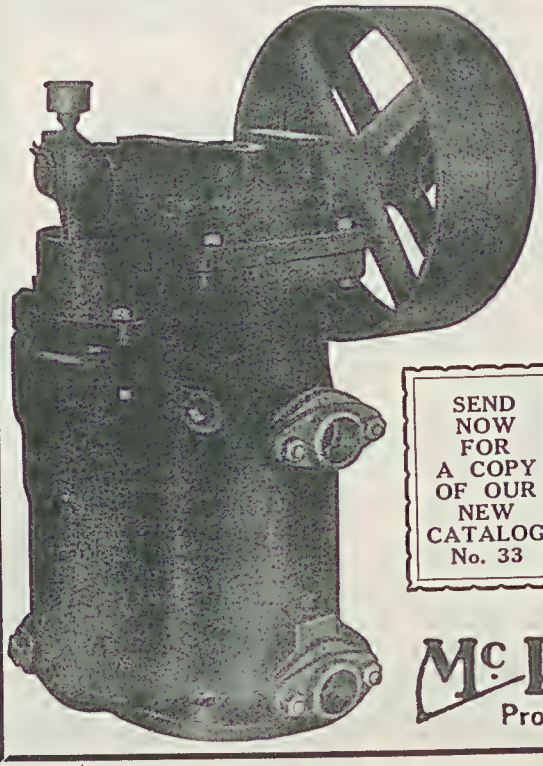

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The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

Werribee Research Farm

Farmers' Field Day

The Minister of Agriculture welcoming the visitors.

THE Annual Farmers' Field Day at the State Research Farm, Werribee, took place on Friday, 29th September last. The weather was fine, and the attendance large, more than 1,000 visitors, representative of the producing, commercial, and banking interests of the community, being present. The guests included His Excellency the Lieutenant-Governor and Mr. Everard, M.L.A. (Acting Speaker). In welcoming the visitors, the Minister of Agriculture (the Hon. J. Allan, M.L.A.) stated that the Werribee Research Farm was carried on by the Government with the object of assisting all branches of agriculture. It had been established not as a commercial farm intended to be carried on at a profit, but as an institution at which scientific and practical agricultural research work could be carried on. This work dealt principally with cereal culture, irrigated crops and pastures, and the breeding and feeding of live stock. In all of these directions remarkable success has been achieved, one example being seen in the great popularity of wheats bred at Werribee. These varieties had proved far superior to those previously grown, and the increased yields that had resulted had put many hundreds of thousands of pounds

Setting out to inspect the experimental plots.

into the pockets of the wheat-growers of Victoria. The successful results that had followed from other work at this station, Mr. Allan added, would be explained during the afternoon, at the end of which visitors, no doubt, would be satisfied that the small expenditure incurred by the State in the upkeep of the Werribee Research Farm is returned a hundredfold.

The Director of Agriculture, Mr. H. A. Mullett, B.Ag.Sc., pointed out that no State could afford to be without a well-equipped service designed to assist in solving the problems of the man on the land. Wheat produced and tested at Werribee had been distributed throughout the State, and had resulted in an increase of approximately 2 bushels per acre to the average yield. In the aggregate, this increased wheat would be valued at about £750,000 per annum, and would add £80,000 per annum to the revenue of the Victorian railways.

Mr. Mullett announced that, in order to increase the facilities for research at this Farm, it was intended to proceed almost immediately with the erection and equipment of a laboratory to enable the extension of the cereal-breeding operations, special attention being paid to the milling quality of the various wheats.

The first series of plots inspected was the Permanent Rotation Field, in which thirteen systems of crop rotation are being compared. The object of the test is to determine the most profitable system of rotation cropping for conditions similar to those at Werribee. As far as is possible, each crop receives the same treatment that it would get if it were growing on a large area. The financial returns from each plot are being determined by the keeping of accurate records, in which the cost of working each plot is entered at current market rates. One outstanding result has been the marked increase in crop yield wherever either the oaten hay or the wheat crop was preceded by a well-worked fallow. In the case of oaten hay, the average increase in yield from bare fallow has been 21.3 cwt. per acre above the yield of the plot continuously cropped.

Manurial and Variety Trials.

The problem of manurial practice to-day is not one in which the advisability of the use of superphosphate is questioned, but rather to ascertain how much to use. It can be shown that this quantity varies with a number of factors, and that its determination with some degree of precision is a matter of considerable importance. Experiments show that on most soils there is a steady and proportionate increase in the yield as the amount of the manure applied is increased until a point is reached after which the same ratio is not maintained, and, eventually, there is no response to still heavier dressings. Obviously, then, in practice it is necessary to determine the manurial application which gives the greatest net profit, and this is not necessarily that which gives the highest yield. It will follow, also, that the higher the price of wheat the greater will be the profit per acre.

The results at Werribee have demonstrated clearly the superiority of superphosphate for wheat over the other forms of fertilizer used. With wheat at 3s. per bushel, a dressing of ½ cwt. super. per acre gives an extra return of 22s. 2d. per acre, and this margin increases with the increase in the rate of application up to 1½ cwt.; there is a further increase with the 2-cwt. dressing, but not sufficient to compensate for the added cost of the manure. Apparently, therefore, under Werribee conditions, the most profitable application is about 1½ cwt. per acre.

The variety trials with cereals are more extensive than usual, and this year occupy an area of 104 acres. Two recent cross-breds, Ranee x Gallipoli, W.5807, J.5-1-1, and Imp. Gluyas x Ranee, W.4212, L.2-1, which yielded so well in several country plots last year, were again promising. An interesting addition to the Selection Plots has been a complete collection of new wheat varieties from other States. Similarly, in the Barley Variety Plots, the numbers have increased, there being nine 2-rowed and six 6-rowed varieties under test this year. The English malting varieties Plumage Archer and Spratt Archer have given good yields under Werribee conditions while retaining the malting quality of their grain.

Pasture Experiments.

It has been definitely established that where February and March rainfall is low, the subsequent carrying capacity of the natural Wallaby grass pastures is seriously reduced. This has been the case this year, and where improvements have been made by the introduction of winter growing annuals, such as Wimmera Rye Grass and Subterranean Clover, no germination occurred until mid-May, and subsequent growth was restricted by low temperatures. Consequently, extensive hand-feeding of breeding ewes has been necessary.

Even on the highly improved irrigated pastures, the effects of the severe season have been felt, but despite this, the benefits accruing from adequate top-dressing with superphosphate and proper management, have been well demonstrated.

In this connexion the results from the rotational grazing experiments are important. Under this method of grazing the carrying capacity of an irrigated pasture has been maintained at fourteen sheep per acre per annum for a period of three years, from November, 1929, to November, 1932. This year lambing ewes have been substituted, and the minimum carrying capacity of this pasture over the winter period has been eight ewes with lambs at foot, per acre. This pasture was sown down in 1917, and receives an annual top-dressing of 2 cwt. of superphosphate per annum and 2 acre feet of irrigation water applied in frequent waterings of moderate amount.

Permanent pastures now occupy a major part of the irrigated area of the farm. This development followed on the experience gained from the tests with grasses and clovers instituted when the farm was founded. As the lucerne thinned out, it has been replaced by sown pastures, because they have been found suitable for irrigated conditions, and are productive, long-lived, and palatable to stock. Pastures have proved much better adapted for grazing than lucerne.

At the conclusion of the inspection of the experimental plots, the dairy, and the poultry pens, visitors were entertained at afternoon tea.

Mr. H. C. Wilson, farm manager, lecturing on irrigated pastures.

Tobacco Growing

North Gippsland Tests

By W. J. B. McDonald, B.Agr.Sc., Assistant Inspector of Agriculture.

Manurial Trials at Stockdale—Unmanured plot in the immediate foreground.

DURING the 1931-32 season a series of plots designed to test the effect of various fertilizer dressings on tobacco plants was established on the property of Mr. G. C. Dunsmuir, of Stockdale, in North Gippsland. Stockdale was chosen as the location for these trials, as it was considered to be representative of a large tract of country suitable from a climatic and soil point of view to the cultivation of tobacco. The bulk of this area lies north of the Maffra-Bairnsdale railway line, and consists of sandy or sandy loam ridges interspersed with a small proportion of quartz and ironstone ridges, these latter, of course, being quite unsuited to tobacco. On the plot site, the soil was a fairly free sandy loam which, at a depth of 6 inches, merged into a reddish brown sand, which in turn gave place at 20 inches to a whitish-coloured sand overlying yellow clay at 30 inches.

The average rainfall for the period October to March, over a period of six years (1925-31) is 1,447 points. The average humidity for these months is considered to be considerably higher than in the north-eastern district, although the mean temperature probably is 3 to 4 degrees lower.

Prior to the establishment of the plots, no tobacco had been grown at Stockdale, although in the same season plantations were established by private growers at Briagolong, 6 miles south-west of Stockdale.

It was hoped that by using imported tobacco seed only problems arising out of blue mould infection would be avoided. An excellent stand of plants was established, no trouble from mould occurring in the seed-bed. During the third week in February, however, the crop —then between 2 feet and 3 feet high—suffered a very severe infection of mould in the form of leaf lesions.

The weight of cured conditioned leaf obtained from each plot is shown in Table I. A big proportion of this leaf was so damaged by mould that it was of no commercial value.

TABLE I.—RESULTS OF MANURIAL TRIALS.

Manurial Dressing Per Acre.	Yield of Cured Conditioned Leaf.
	lb. per acre.
Super., 5 cwt.	1,192
Super., 5 cwt. + pot. sulph., 150 lb. + dried blood, 150 lb.	1,187
Super., 7 cwt.	1,155
Super., 5 cwt. + dried blood, 150 lb. ..	1,140
Super., 3 cwt.	1,130
Super., 5 cwt. + pot. sulph., 150 lb. ..	1,099
No manure	273

The results of the first season's work demonstrated two important facts:—

(1) That the utilization of imported seed does not confer on the crop any immunity from blue mould; and

(2) That at Stockdale, tobacco cannot be grown without the application of superphosphate, 5 cwt. per acre being the dressing recommended.

In the following season (1932-33), a more comprehensive series of experiments was laid out. These included variety, topping, time of sowing, and manurial trials. Each plot consisted of a single row of 53 plants spaced 2 ft. 3 in. apart within the rows which were set out at intervals of 3 ft. 6 in. Each plot was replicated five times and, with the exception of the manurial trials,, was dressed with super. at the rate of 5 cwt. per acre. All seedlings set out were raised from American seed.

Raising the Seedlings.

A small area of virgin forest on the brow of a hill was cleared, and the timber burnt *in situ*. This area was cultivated shallowly and worked into a good tilth, a mob of sheep then being penned on the site overnight as a convenient and economic method of fertilizing the ground. Seed was sown on 6th August, and the beds were then dressed with well-rotted sheep manure, which it was found still carried great numbers of viable seed of burr clovers and trefoils. These subsequently germinated, and made necessary a good deal of weeding. The seedlings made satisfactory growth, however, and the first picking was made on 27th October. A later sown series of beds developed mould on the 6th December, and was destroyed immediately.

Variety Trials.

The six varieties listed below—all raised from imported seed—were tested at Stockdale. Seedlings were set out under favorable weather conditions on 27th October, and no difficulty was experienced in establishing a satisfactory strike except with the variety White Stem Oronoco, where the number of replants required totalled 30 per cent. of the number set out.

During November and December the plants made excellent growth, White Burley, Hester, and Cash being the most rapid growers in the early stages. Towards the latter end of December, blue mould appeared in the field in a virulent form, all leaves being badly spotted. On 16th January all variety plots were topped and rubbishy bottom leaves removed.

The first picking took place on 24th January, the second on the 21st February, and the third on 13th March. At the first picking the bulk of the most severely damaged leaf was discarded, and this quantity is not included in the yields from the plots. The bulk of the leaf came out of the kiln in a slightly immature condition, and failed to mature rapidly in the bulk. This is abnormal for this district, as leaf bulked on previous occasions has matured very rapidly and completely. Possibly this was due to the fact that practically all plants had become systemically infected with mould, and that the leaf when picked, although of a good ripe colour, lacked life and vigour.

The leaf was graded and weighed during August. The range of colour grades was very limited, practically all of it being either a bright mahogany or inferior bright with a small percentage of green leaf. The results are set out in Table II. yields being shown in lb. per acre of cured conditioned leaf.

Table II.—Variety Trials.

Variety.	Total Yield.	Bright Mahoganys. BM_1, BM_2, and BM_3.	Inferior Bright.	Scrap.	Green.
	lb. per acre.	lb. per acre.	lb. per acre.	lb. per acre.	lb. per acre.
Warne ..	616	284	196	118	16
Gold leaf ..	565	184	212	156	13
Cash ..	410	122	150	120	18
Hester ..	407	156	145	106	..
White stem oronoco ..	303	107	121	69	6

Note.—The variety White Burley was a failure. It is estimated that blue mould reduced the yield of all varieties by more than 50 per cent.

It will be seen from this table that in the season 1932-33 the varieties Warne and Gold Leaf were definitely superior to Hester, Cash, and White Stem Oronoco in respect to both total yield and the yield of the first two grades which could be classed as readily marketable leaf.

Of the two top-yielding varieties Warne and Gold Leaf, it will be seen that in addition to giving a greater total yield, the increased weight from Warne occurs in the top grade. Although one year's results cannot be taken as establishing the fact that Warne is the variety best suited to the Stockdale district, they do bear out the experience of some local growers who have achieved considerable success with this variety in this particular area, and the variety Warne is recommended, therefore, as being well suited to this district.

Topping Tests.

There has been considerable controversy as to the wisdom or otherwise of topping tobacco. For many years growers have been rather lax in attending to this phase of tobacco culture, and this tendency has been aggravated in recent seasons by the fact that some older growers situated on heavy country have refrained from topping in an effort to reduce the amount of body in their leaf. Many growers on light soils have followed this example with very unprofitable results.

Stringy-bark curing barn in which leaf from the Stockdale experimental plots was cured.

Table III. shows the results obtained from a crop of Hester by topping in various manners, the yield again being shown as cured conditioned leaf in lb. per acre.

TABLE III.—TOPPING TESTS.

Treatment.	Bright Mahogany. BM_1, BM_2, and BM_3.	Inferior Mahogany.	Scrap.	Total.
	lb. per acre.	lb. per acre.	lb. per acre.	lb. per acre.
Heavy topping ..	208	280	156	644
Light topping ..	163	236	172	571
Untopped ..	129	227	188	545

These tests showed that by refraining from topping at Stockdale, the total yield was reduced considerably, all the reduction taking place at the expense of the two top grades. Leaf from untopped plants had not the same life, body, or elasticity as leaf from topped plants, and each individual leaf was much smaller and lighter. The saving in field labour by refraining from topping is offset largely by the added labour in picking, stringing, and grading, as many more leaves have to be handled to obtain the same weight as would be obtained from topped plants.

It is considered that results from this experiment can be taken as applying very closely to all light sandy loam soils. On this class of country the topping of all plants from fourteen to sixteen leaves is recommended.

Time of Planting Tests.

In an endeavour to determine the optimum planting-out period in North and East Gippsland, transplantings were made on 28th October, 15th November, and 6th December. All plants established themselves successfully, but the last planted seedlings were wiped out by an attack of mould in the field.

Results in lb. of cured conditioned leaf per acre are shown in Table IV.

TABLE IV.—TIME OF PLANTING TEST.

Treatment.	Grade 1.	Grade 2.	Grade 3.	Total.
	lb. per acre.	lb. per acre.	lb. per acre.	lb. per acre.
Early planting, 28th October, 1932 ..	224	123	115	462
Mid season planting, 15th November, 1932	67	41	37	145

Manurial trials were planted on the 15th November. These plots became well established, but by the 16th January were very heavily infected throughout with blue mould, and later died out completely. In future work it is hoped to achieve some greater resistance to field mould at Stockdale by raising seedlings from locally-grown seed.

SHEPPARTON TESTS.

Following are further results from the tobacco experimental plots at Shepparton. Results of other tests at this centre were published in the October issue of the *Journal*.

Every year some tobacco-growers find that they cannot obtain a sufficient number of clean tobacco seedlings to plant the whole of the area prepared for the crops. Late in the planting-out season there usually is available a supply of tobacco seedlings which, having been infected with mould earlier in the season, have been left in the beds until they have recovered a certain amount of vigour and have made a fresh growth. There is considerable diversity of opinion as to the suitability of these plants for the establishment of a tobacco crop. A late crop usually is difficult to cure, and is liable to be ruined by an early frost, but experience in the plots at Shepparton during the past season indicates that an excellent yielding crop can be obtained from plants of the above-mentioned type, if growers are prepared to give them more than ordinary attention, especially just after planting out.

An even crop of young Tobacco at Shepparton.

On 11th January, 1933, a series of plots was set out with plants which had been in the seed-bed for approximately five months. These plants had been attacked with blue mould early in the season and subsequently starved for water. In January, following an application of water, some fresh growth was made. It would be difficult to imagine more unattractive looking plants, as they were very "staggy" and woody looking, with a long tap-root devoid of fibrous roots.

The tap-roots were pruned back severely, and the plants set out after the ground had been thoroughly irrigated. Superphosphate at the rate of 5 cwt. per acre was applied about two months prior to setting out the seedlings.

These plants struck well, considering the quality of the seedlings, and with frequent watering and thorough and deep cultivation made remarkable progress. The varieties Hickory Pryor, Conqueror, Dungowan, and Warne were represented. All varieties were topped early and very heavily—to about twelve or fourteen leaves—and no sucker growth was allowed to persist. The leaf ripened very rapidly and uniformly, the bulk of it being ready to pick when it was destroyed by frost on 24th April.

In order to determine the relative yielding ability of plants grown under these conditions the leaf was picked and weighed green, and these yields, together with a set of figures indicating the amount of cured leaf that it is estimated would have been obtained had it been possible to cure this leaf, are set out in the accompanying table. The average return of cured conditioned leaf from all green leaf put through the kiln at the Shepparton plots was 23 per cent., and the calculated weights of cured leaf from this series of plots are determined on that basis.

Variety.	Yield of Green Leaf.	Calculated Yield of Cured Conditioned Leaf.	Percentage Survival of Seedlings.
	lb. per acre.	lb. per acre.	Per cent.
Hickory-Pryor ..	6,618	1,522	92.5
Dungowan ..	6,018	1,384	83.1
Conqueror ..	5,637	1,296	92.2
Warne	5,331	1,226	94.5

In this instance Hickory Pryor would have given the excellent yield of over 1,500 lb. per acre with Dungowan, Conqueror, and Warne, maintaining the same order as was established in the variety trial, the results of which were published in the October issue of this *Journal*.

Judging by green leaf characteristics this leaf would have been of good quality, as it was of excellent textured web and possessed very fine veins and ribs. No replacing of

A plant of White Burley tobacco, showing effects of blue mould and grub damage.

plants was attempted in this particular experiment. The percentage survival figures furnish a comparison of the completeness with which in this instance different varieties made good growth after mould in the seed-bed.

The success of these plants is a particularly gratifying result, as it demonstrates that with proper cultural treatment a heavy yielding crop can be obtained from plants that have made fresh growth after being attacked by blue mould. It must be remembered, however, that seedlings of this type require nursing, and that it would be folly to allow a tall growth to occur, as the stalk is very brittle and liable to snap under more than ordinary stress.

Tests with Freshly "Moulded" Plants.

Frequently, growers are in a quandary as to whether it is advisable or not to transplant tobacco seedlings at the first sign of mould in the seed-bed. From numerous observations made on private properties, and as the result of two years' experience at the Shepparton plots, it is considered that plants set out at this stage do not thrive.

Two plots A and B were sown with very small seedlings on 11th January before mould appeared in a late sown bed. Two more plots C and D were sown just as mould appeared in this particular bed on 18th January, while two more plots E and F were sown with plants from the same bed on 25th January. The total yields of green leaf from the three pairs of beds were as follow:—

A and B	.. 71 lb. 8 oz.
C and D	.. 35 lb. 0 oz.
E and F	.. 79 lb. 15 oz.

On many occasions during the past two years, it has been demonstrated that it is almost impossible to obtain a satisfactory strike from plants which do not themselves exhibit signs of mould, but which have been taken from a bed in which blue mould is just making its appearance. It is better to wait until the bed is wiped out completely, or shows some signs of recovery from the disease. Almost invariably the labour of setting out suspect plants is wasted.

[*Continued on page 569.*

Blue Mould damage.

Pasture Plant Research

Work at Burnley

By J. E. Harrison, B.Agr.Sc., Senior Agrostologist

PASTURE plant research at Burnley was undertaken with the primary object of investigating important pasture species for the presence of different strains. Similar work in other countries has shown that distinct strains or varieties of the common pasture species exist, and may exhibit adaptation to special conditions or be suitable for special uses. The aim at Burnley is to separate the principal pasture plants of the State into strains and, by field tests, to discover those which are most suited to the various districts.

The extension work carried out by the Agrostology Branch as a natural adjunct to this detailed study of pasture plants consists of field trials in the various districts, lectures to farmers, and personal contact with individual farmers on their own farms, or with those who may visit the Branch to inspect the work. The Agrostology Branch is invested also with the duties of seed testing, a necessary adjunct in any progressive agricultural community. Any farmer or merchant may forward seed samples for testing for purity and germination. At present this service is free of charge.

The field work began in the autumn of 1928 with strain investigation of subterranean clover. In the same year the Wimmera rye-grass selections were transferred to Burnley from the State Experimental Farm at Rutherglen. In 1929 some 150 lines of subterranean clover seed, collected from numerous sources, were sown and subjected to a critical examination. The Wimmera rye-grass selections were grown on, and special attention was given to a study of the need for cross pollination by this plant. Strain investigation was begun on a small scale also with rye-grass, cocksfoot, and white clover In addition, a specimen section was established for educational purposes.

During 1930 these activities were continued and elaborated, especially in regard to subterranean clover and Wimmera rye-grass. In 1931, when the Agrostology Branch was officially formed as a unit of the Agricultural Division of the Department of Agriculture, there was a considerable extension of the investigations into strain in perennial rye-grass, about an acre of land being devoted to single plant and sward trials with this grass. In addition, frequency of cutting trial with annual grasses was carried out.

During 1932 the investigations were maintained and extended, fresh material being obtained, and increased areas being devoted to plantings of each of the above species. In addition, a lucerne plot was established from material collected from various sources at home and abroad.

The present year, 1933, has witnessed practical commercial results of the investigation

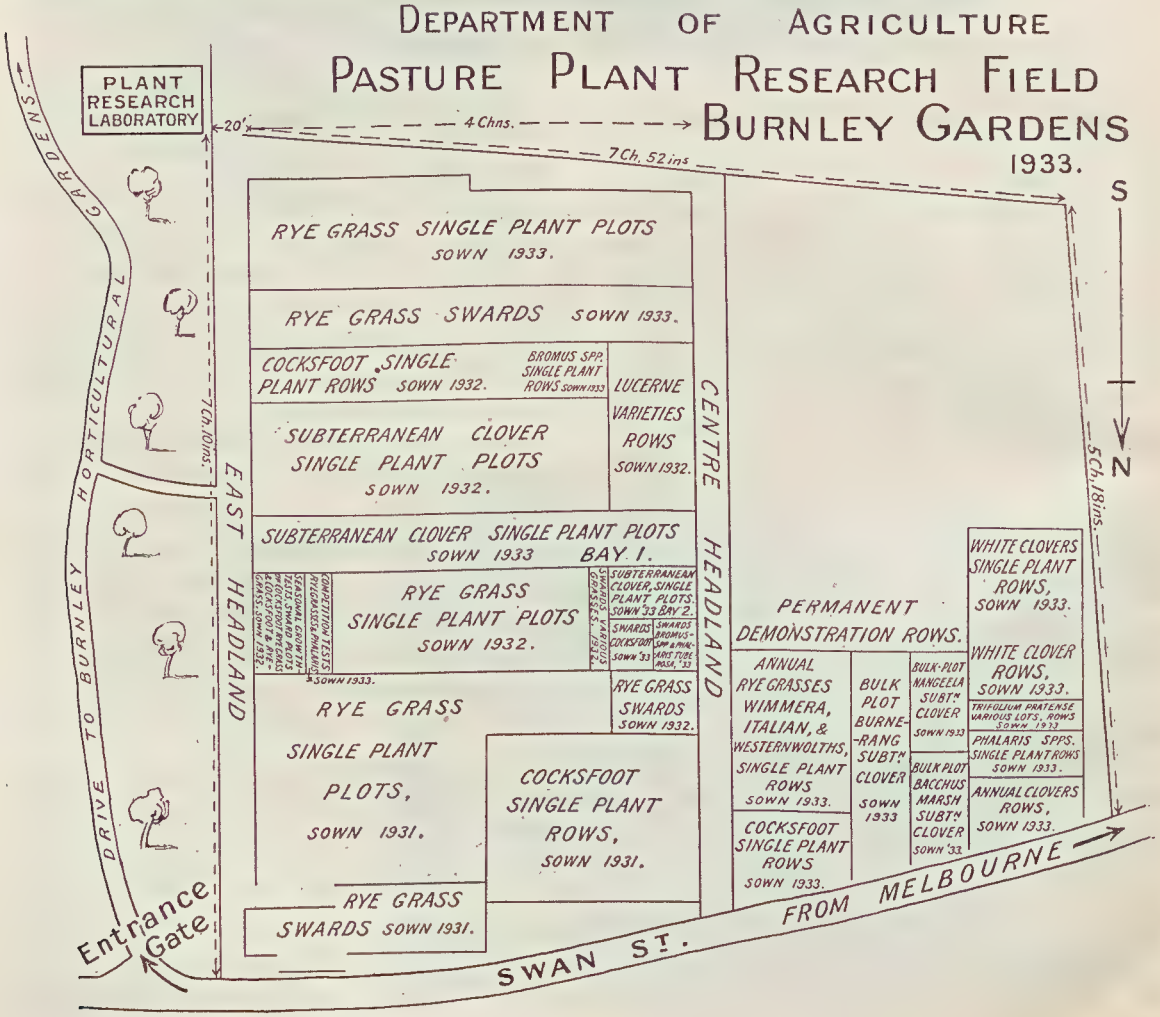
of rye-grass strains. Of the numerous collections made from farm pastures in previous years a large proportion of satisfactory merit came from the Colac district, where a seed industry is steadily developing. Last season the Colac Perennial Rye-grass Growers Limited approached the Department for assistance in selecting fields suitable for harvesting for seed, and the services of the officers of the Agrostology Branch were made available. As a result the company was enabled this year to market seed from pastures provisionally approved of as containing a satisfactory strain of perennial ryegrass.

In the Pasture Research Field the trials with ryegrass were extended to include samples from all the fields provisionally approved of at Colac. A number of samples also was included from other seed-growing districts, such as Ballarat and Kyneton, and the outcome of this work, it is expected, will be an instructive survey of the local seed crop of this important species.

Location and Area.

The Pasture Plant Research Field is located in the Burnley Gardens, situated some 3 miles from Princes Bridge, Melbourne. The Gardens are bounded by the River Yarra on the east, Swan-street on the north, and the Richmond Park to the south and west. Its close proximity to Melbourne makes it easily accessible to visiting farmers.

The area devoted to investigational work is approximately 5 acres. The soil is a stiff grey loam, drained by both underground and surface drains. The average annual rainfall at the station is approximately 26 inches, fairly evenly distributed throughout the year.


DEPARTMENT OF AGRICULTURE
PASTURE PLANT RESEARCH FIELD
BURNLEY GARDENS
1933.
PLANT RESEARCH LABORATORY
20'
4 Chns.
7 Ch. 52 lins
7 Ch. 10 lins.
5 Ch. 18 lins.
S
N
GARDENS
DRIVE TO BURNLEY HORTICULTURAL
EAST HEADLAND
CENTRE HEADLAND
RYE GRASS SINGLE PLANT PLOTS SOWN 1933.
RYE GRASS SWARDS SOWN 1933.
COCKSFOOT SINGLE PLANT ROWS SOWN 1932.
BROMUS SPP. SINGLE PLANT ROWS SOWN 1933
LUCERNE VARIETIES ROWS SOWN 1932.
SUBTERRANEAN CLOVER SINGLE PLANT PLOTS SOWN 1932.
SUBTERRANEAN CLOVER SINGLE PLANT PLOTS SOWN 1933 BAY 1.
SUBTERRANEAN CLOVER, SINGLE PLANT PLOTS. SOWN '33 BAY 2.
SWARDS COCKSFOOT SOWN '33
SWARDS BROMUS SPP. & PHALARIS SOWN 1932
SWARDS VARIOUS GRASSES SOWN 1932
COMPETITION TESTS RYEGRASSES, PHALARIS SOWN 1933.
SEASONAL GROWTH TESTS, SWARD PLOTS
RYE GRASS SINGLE PLANT PLOTS SOWN 1932.
RYE GRASS SINGLE PLANT PLOTS, SOWN 1931.
RYE GRASS SWARDS SOWN 1932.
COCKSFOOT SINGLE PLANT ROWS, SOWN 1931.
RYE GRASS SWARDS SOWN 1931.
PERMANENT DEMONSTRATION ROWS.
ANNUAL RYE GRASSES WIMMERA, ITALIAN, & WESTERNWOLTHS, SINGLE PLANT ROWS SOWN 1933.
COCKSFOOT SINGLE PLANT ROWS SOWN 1933.
BULK PLOT BURNE-RANG SUBTn CLOVER SOWN 1933
BULK PLOT NANGEELA SUBTn CLOVER SOWN 1933
BULK PLOT BACCHUS MARSH SUBTn CLOVER SOWN '33
WHITE CLOVERS SINGLE PLANT ROWS, SOWN 1933.
WHITE CLOVER ROWS, SOWN 1933.
TRIFOLIUM PRATENSE VARIOUS LOTS, ROWS SOWN 1933
PHALARIS SPPS. SINGLE PLANT ROWS SOWN 1933.
ANNUAL CLOVERS ROWS, SOWN 1933.
Entrance Gate
SWAN ST.
FROM MELBOURNE

Subterranean Clover Plots.

Strain Investigational Work.

Subterranean Clover.

The first plant on which critical work was done was subterranean clover, a species which is adapted to a wide range of soil and climatic conditions, and is naturalized in all districts except the Wimmera and the Mallee. In addition to numerous collections of seed made in Victoria, samples have been obtained from other Australian States, England, New Zealand, Germany, France, and America. All have been sown in plots of 100 single plants and compared for differences. Botanical variations have been noted and used in describing and separating varieties—differences between leaves, stems, flowers, and fruits.

From the pasture point of view, however, vegetative characters are more important. On this basis there have been separated early maturing and late maturing strains, leafy and stemmy strains, free seeders and shy seeders. Some wilt and die in late November, while others keep green into early January. The different strains have been grouped according to the time they commence to flower into early, mid-season, and late flowering strains. The early flowering strains are sparse and stemmy, and die off early, whereas the late flowering strains last longer into the season and are dense and leafy. The mid-season strains, to which practically all commercial samples belong, vary between these two extremes. Total production under pasture conditions may be expected to vary with the length of life and the degree of leafiness of the strains. The late strains have thus the possibility of giving heavier hay crops, but it would appear from the present season's observations that the early strains are capable of better winter growth.

In a general way the various strains have come from districts to which one would expect them to be adapted—early strains from early districts of light rainfall, such as Mulwala, and late strains from late districts with liberal rainfall, such as Bena. Numerous strains have

been isolated, of which those from the following districts are giving most promise:—

Early strains—Mulwala, Springhurst, and Bacchus Marsh.

Mid-season strains—Nangeela, Wangaratta, and the selection from Wangaratta—Burnerang.

Late strains—Tallarook, Bena, Macarthur, Kyneton, and New Zealand selections.

"Burnerang" has been developed at Burnley from the seed of a single plant which was isolated from the Wangaratta strain. It has very short runners, and its leaves have an upright habit of growth, and are relatively abundant in proportion to the amount of stem. This selection is a perfect example of the self-fertility of subterranean clover, in that the seed from one original plant was multiplied in two years up to 20 lb. without any variants having appeared.

It is considered that when seed is available in commercial quantities, the different strains will be capable of greatest development in the districts where they have been found, or in areas where rainfall and soil type are similar.

Wimmera Rye-Grass.

With the object of improving the pasture lands of the lighter rainfall districts, observations on Wimmera rye-grass were begun at the Rutherglen State Farm some nine years ago, and a strain known as the Rutherglen New Strain has emanated from there. In the autumn of 1928 the selections were transferred to Burnley. The difficulties of strain investigation in this plant are accentuated by the fact that it is an annual requiring cross fertilization, so that the breeding of a pure line must be regarded as impracticable. In 1930, however, the existing strains were classified into early, mid-season and late strains, and since then the work has aimed at the development of "groups" of plants pure in this respect.

It is considered that the field of usefulness of this plant may be extended if both earlier and later maturing strains than the ordinary commercial one are developed. Wimmera rye-grass makes splendid winter growth, is able to take advantage of short seasons, and may be maintained satisfactorily from year to year by re-seeding and light cultivation. It is considered possible that this plant may be introduced with advantage into poor pastures by drilling in a light sowing early each autumn.

Perennial Rye-Grass.

The possibility of clarifying the rye-grass position in Victoria prompted the establishment of these plots. Clearly much of the seed being sold as perennial is not true to

Rye-grass Strain Investigations—General view of single-plant plots.

name, in that it is not giving rise to perennial or long-lived plants. In order to discover the origin of such seed, extensive collections of samples of rye-grass seed were made from as many sources as possible. Samples of all shipments entering Victoria, either from New Zealand or the United Kingdom, were secured, and as many samples as possible were obtained from commercial growers in the Western District of Victoria and elsewhere. In addition, eighteen samples of New Zealand seed were kindly supplied by the New Zealand Department of Agriculture. These consisted of three samples of each of six types into which New Zealand rye-grass has been classified by Levy and Davies. Several samples also were supplied by Melbourne seed merchants, and as it was desired to investigate possible future sources of supply, as well as existing sources, samples were collected from numerous old-established pastures throughout southern Victoria.

Rye-grass Strain Investigations.
(Close view of single-plant plots.)

Two types of plot were used for investigating each sample, one containing single plants and the other being a small broadcast plot maintained as a sward by mowing. In the first year the single plants were allowed to flower, and were then cut in the hay stage in the late spring. They were then cut back as often as necessary until the following winter, after which they were allowed to run to ear again. The treatment, indicated above, of the broadcast and single plant plots has been maintained throughout their lives.

The single plant plots have given evidence as to longevity and vegetative and botanical characters, and the broadcast plots evidence as to recovery and persistence under frequent cutting. Though the trial was designed primarily as a test of the perenniality or length of life of the different lots, eye estimations are made of their comparative growth. New Zealand certified permanent pasture seed has been used as a control in both types of plot, being systematically scattered throughout the single plant plots and sown alongside each broadcast plot.

These experiments have shown that all seed imported into Victoria except New Zealand certified seed is of a bad or poor pasture type; that from New Zealand (uncertified) being chiefly short-lived, and that from the United Kingdom being unproductive and less persistent than the good perennial lots. The majority of samples from Victorian old pastures have proved to be productive and long-lived types, and many samples collected from old pastures not previously harvested for seed indicate that it would be possible to harvest a very much larger quantity of good seed than is at present collected.

The outcome of these trials demonstrates the existence of two main classes of rye-grass in each of the three principal rye-grass producing countries of the world. The English type of each class differs from its New Zealand counterpart, and the New Zealand type from its Victorian counterpart, probably as the result of climatic and other influences acting upon and selecting somewhat different forms for survival in each country. But though different in type the three members of each class are closely allied, and permit

the following simple classification to be made:—

Country of Origin.	Perennial Form.	Short-lived Form (Biennials and/or Annuals).
United Kingdom	English (or Irish) rye-grass	Italian rye-grass
New Zealand ..	Hawke's Bay rye-grass	South Island rye-grass
Victoria ..	Western District rye-grass	Wimmera rye-grass

In all cases the perennial form is a strictly pasture type, and the short-lived form a hay or fodder type suited to arable conditions. In each country, its own forms appear to be of special value, and are highly adapted to local conditions, but the forms of one country are not always suited to another country. The English perennial type shows poor adaptation to Victorian conditions, but the Hawke's Bay type has so far given satisfactory results as a persistent and long-lived plant, and compares favorably with Western District rye-grass in this respect. It has yet to be learnt, however, what differences (if any) exist in nutritive value and palatability.

Cocksfoot.

Investigations with cocksfoot were started in the autumn of 1929, when rows of Victorian, Akaroa, and Danish seed were sown. In the following year the work was extended a stage further by increasing the number of Victorian samples, using commercial samples of New Zealand, Akaroa, and Danish seed as controls. In 1931 single plant trials were undertaken, and are being maintained and increased. Last year some 90 rows of single plants were sown with seed collected from as many sources, and these, together with further additions made this year, are undergoing critical examination. The seedlings are transplanted into single rows with the plants 2 feet apart in the rows. Each row is being investigated for the presence of persistent leafy plants and the proportion in which they are present.

Although Akaroa cocksfoot is considered to be the best type obtainable commercially, these trials have indicated that for productiveness and longevity Victorian cocksfoot is equal to, and, in many cases, better than the average New Zealand type under Burnley conditions. Danish cocksfoot has shown itself to be inferior to both Victorian and Akaroa lines. It is significant that large quantities of Danish seed and small amounts of Akaroa are imported into Victoria annually. The possibilities of a considerable expansion of the cocksfoot seed industry in Victoria are indeed very favorable, provided that it is developed in respect of superior strains, and that clean, viable seed is harvested.

White Clover.

The work on white clover was begun in 1930, when a number of broadcast rows was sown. These included New Zealand and English strains, together with samples from many Victorian sources, including the irrigation districts. In 1931, further collections were made, and single plant trials were undertaken. Each line is being examined to determine its average characteristics in respect of leafiness, time of flowering, and length of life.

These trials have demonstrated that there are distinct local Victorian strains in which early or late flowering, leafy or stemmy, and

Rye-grass—Broadcast plots mowed to prevent re-seeding.

short or long-lived plants, may predominate. The seed of this plant is not as yet harvested in Victoria—our supplies coming from New Zealand and Europe—but it is evident that many of our volunteer stands of white clover, and more particularly those in the irrigation districts, are of an excellent type and well worthy of harvesting for seed. It is a definite loss to the State that the commercialization of our own strains has not been undertaken.

Future Scope and Work.

The prosecution of the investigations in progress will be directed towards the further examination of our principal grasses and clovers for the presence of clearly defined strains, and towards determining the suitability of these to the different climatic regions of the State. The differences between these regions are considerable, and necessitate close and detailed study of pasture species in order that the types most suited to each may be determined, and the most productive pastures established on which to graze our increasing numbers of sheep and cattle.

The work so far undertaken, in addition to clarifying a very involved position in respect of rye-grass and cocksfoot in particular, has demonstrated the existence in Victoria of numerous strains of pasture grasses and clovers naturally selected by soil and climate, and by the special type of management which has been superimposed upon them.

In conjunction with the Victorian Pasture Improvement League, the Department of Agriculture has laid down numerous trials in Southern Victoria, with the object of determining the most suitable species, strains, and mixtures for different soils and different districts. Information is thus steadily being obtained in respect of those elements which may most suitably be used in the establishment of both temporary and permanent pastures throughout the grazing areas of the State. Where it is justifiable also, farmers are being encouraged to harvest pasture seeds on a commercial scale, and to market them in such a manner that they maintain their identity in commerce as special and suitable strains for the establishment of Victorian pastures.

Lucerne Strain Trials.

Cherry Growing in Victoria

No. 2.—Care of the Trees

[The first article of this series dealing with varieties, location, soils, and stocks appeared in the September issue of this Journal.]

By F. J. Greatorex, Orchard Supervisor

Early Purple Guigne on seedling—25 years old. Note shyness of fruiting buds.

Bud Selection.

THE importance of bud selection in the successful growth of deciduous fruit trees in Victoria has not been sufficiently appreciated in the past, and only of late years have nurserymen and orchardists begun to realize the necessity for greater care in this regard.

At one time, buds and scions were gathered indiscriminately in the orchard, irrespective of whether the trees they were taken from were good bearers, and true to type or not, and it is possibly to this fact that the presence of so many poor-bearing trees in our orchards is due. Despite the growing recognition of the need for more care in bud selection, there are still many orchardists who make their bud and scion selections in the unmethodical manner described, and in the interests of the fruit-growing industry in general, it is necessary that this aspect of fruit-tree culture should be

given a greater amount of attention than it has received previously, particularly as it costs no more to produce and grow a good tree than a bad one.

Budding and Grafting.

As buds for grafting or budding purposes are not secured until after the fruit is picked, it is wise to mark the trees which are producing good crops, and are true to type, when they are fruiting, as a guide to bud selection later.

As with all fruit trees, the different varieties of cherries are obtained by budding and grafting, but of the two methods, a better "take" is effected by grafting. This applies especially to stocks raised in the nursery.

Budding in Victoria is performed on cherry trees during the months of December, January, and February, when the sap is running freely. The operation is not difficult, and with practice may be easily performed. Only well-developed buds from the good bearing trees of proved strain should be used. Care should be taken in removing the bud from the "bud-stick." The small portion of the wood that is cut with the bud is sometimes removed, but if cut thin may be allowed to remain. When taking out this wood, great care should be taken to see that the small pin point of wood running to the eye of the bud is not removed, otherwise the bud will not "take." The stalk of the leaf is left on the bud and acts as a handle when inserting the bud into position. The bud is inserted just under the bark, next to the cambium layer (a thin layer of greenish-coloured tissue situated between the bark and the wood) in a T-shaped cut made in the stock, and is then securely tied with raffia. This latter operation should be done with great care, as it is as important, if not more so, than the preparation of the bud for insertion. The bud is left in this condition until a good union results, when the tie is cut or loosened. The bud remains dormant until the following spring.

Fig. 17.—Bigarreau Twyford on Kentish Stock. Lean of tree is due to uneven root production.

Fig. 18.—A 24-year-old tree which yields 6 to 7 cases of cherries a year.

For successful budding, the following points should be observed:—(1) Use a very sharp knife; (2) use only well-matured buds; (3) bud when sap is running freely; (4) do not allow the sap on either bud or stock to become dry or brown; (5) the tie should receive attention a few weeks after budding takes place; (6) about six weeks after the bud commences to grow, the new growth may require attention in the matter of staking or pinching back to prevent damage by wind. This applies only to re-worked trees.

The Whip or Tongue Graft.

The whip or tongue graft is used when scion and stock are of somewhat similar dimensions, or in instances where the stock is twice the thickness of the scion. From three to five main arms containing young growth, are selected, and a scion placed on each, as follows:—Each limb is cut so that a smooth slanting surface is obtained. The operation should be performed by making two clean cuts with a sharp

Fig. 19.—A whip graft.

knife. The scion is then treated similarly, and a small "tongue" made in the surface of both stock and scion. A union is made by bringing the cut surfaces together, so that the two "tongues" fit into each other. (See Fig. 19.) The cambium layers of both stock and scion should come into close contact with each other, otherwise the graft will not be successful. The grafted portions are then tightly bound together with a waxed cloth or insulating tape, which acts as a tie, as well as affording protection to the graft. The whip or cleft graft is used for young stock in the nursery to a greater extent than any other graft.

The Strap Graft.

Another method of grafting is the strap graft, which crosses the cut surface of the limb. The scion is cut in such a manner that a strip of bark, with a little wood attached (see Fig. 21) is removed. This forms the strap.

The wood from which the cut has been made is then removed by making a slanting cut about 1 inch long on the opposite side from where the "strap" was cut. The length of the strap should be the diameter of the stock, plus about $1\frac{1}{2}$ inches. The scion is then ready for insertion in the stock, while the bark is cut and eased away from the opposite side of the stock from where the scion is placed, to allow the insertion of a portion of the "strap" into the stock. The whole is then securely tied and waxed. It is essential to tie the strap hard down on to the surface of the cut, which, in a short time will be covered by the "strap." This type of graft may be quickly performed after a little practice.

Fig. 20.—The same graft as shown in Fig. 19 a year later.

Trees worked direct on the roots of Mazzard, Mahaleb, and Kentish stocks are shown in the accompanying illustrations.

The Bark or Rind Graft.

The bark or rind graft, like the strap graft, is used for the re-working of trees with limbs an inch or more in diameter. The tree which is to be worked over is cut down to about 6 to 12 inches above the crotch (where the main arms branch out from the trunk), and selection is made of the most suitable position to receive the scion, which is then prepared in a somewhat similar manner to the scion used in the whip graft, but no tongue is made. Having prepared the scion, the bark on the stock is then prepared to receive it. This can be done in two ways. One is to make a simple straight cut with the point of the knife, about 1 inch or so in length down from the cut face of the limb; the bark is then gently eased away from the wood and the scion slipped in. The other way is to loosen the bark without cutting it; the scion is then slipped down between the bark and the wood.

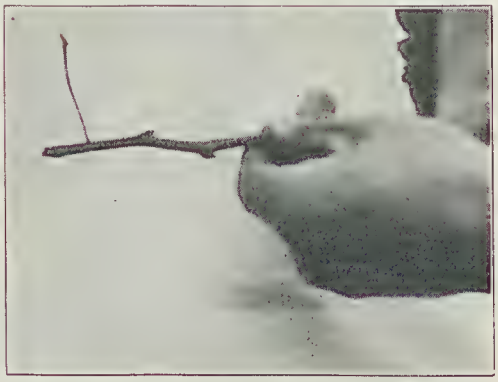


Fig. 21.—The scion for a strap graft prepared ready for grafting.

Both the bark or rind graft and the strap graft should not be done until the sap begins to flow, otherwise the bark will not lift cleanly.

The Wedge Graft.

The wedge graft is another method used in the grafting of cherry trees. This is performed by lopping the limb on which it is desired to place the graft. The limb should then be split by a sharp wedge or similar tool, care being taken that the split does not extend more than four or five inches down the limb. That portion of the scion to be inserted should be wedge-shaped, and the split in the stock held open with a chisel while the scion is being placed in position. The cambium of both scion and stock must coincide. No tying is necessary other than to make the graft airtight. Three of the most-used methods for performing this operation are:—

(1) By application of a moist clay covering to the cut, and the whole of the scion, except the last eye;

(2) by wrapping a newspaper round the stock and tying it at the bottom, leaving the top open. Earth may then be inserted, until all but the last bud of the scion is covered. The soil then should be pressed down firmly;

(3) by painting the cut, and that part of the scion where it joins the stock, with a mixture of "Colas," and starch. These materials should be melted together and applied, care being taken that the cuts are made thoroughly airtight.

When the graft begins to grow, it is advisable to nail several strips of wood to the arm, as a protection against the wind, which often breaks the tender unprotected growth.

In preparing the scion, it is always a good practice to have a bud about half an inch from the bottom of the scion, so that the graft may still grow, even if the upper portion be broken by the wind.

Where the limb is sawn off in preparation for the graft, the edges of the bark torn by the saw should be smoothed off with a sharp knife. Generally speaking, the wedge graft has been superseded by other and more modern methods.

Various new methods of grafting are being experimented with in Victoria at present, but the results of these tests are not yet definite enough to warrant a description of the methods employed.

Further details of grafting methods are contained in Bulletin No. 63, which may be obtained on application to the Department of Agriculture, Melbourne, at a cost of 4d., including postage.

Fig. 22.—A 20-year-old tree, Bedford Prolific on Mahaleb.

Trees Suitable for Planting.

The selection of trees suitable for planting is a matter that should be given close attention by orchardists, and information in this regard should always be sought from reliable sources.

It is common to find in orchards trees not true to name. This sometimes occurs through faulty collecting of buds, or careless labelling in the nursery, but, whatever the reason, it proves costly to the purchaser, as the trees may be growing for some years before the mistake is noticed.

Good reliable trees cost little more than unreliable trees, and it is unwise to risk failure with the latter for the sake of a small initial reduction in cost. Trees should not be selected for their size alone, as the largest are not always the best. Well-grown one-year-old trees are generally very satisfactory, and are nearly always well-rooted.

Cherry trees should be handled carefully when being dug up or packed in the nursery, as the buds are easily knocked out. This

makes the young tree difficult to prune, especially if it is branched. Rods make good trees, and can be pruned to one's own idea of shape. When ordering cherry trees, emphasis should be laid on the variety required, and care should be taken that the type of stock required is supplied.

Bundles of trees received from the nurseries usually are packed in straw or rushes. As soon as the parcel is received it should be carefully opened, and the trees heeled into the ground until they are needed for planting out. This is necessary, as the wet straw in the bundle soon ferments and sweats, and the young trees are much damaged by overheating. They should be planted before growth commences, otherwise both the new roots and the tree itself may sustain considerable injury.

Planting.

As cherry trees commence to grow at the beginning of spring, they should be planted early, otherwise a proportion may die. In planting, the principal points to remember are:—

(1) First prune the roots, cutting off all bruised and broken members. (See Figs. 23 and 24.) Plant the tree to about the same depth as it was growing in the nursery. This may be seen by the "earth-mark" on the trunk.

(2) Set the tree firmly in the ground, spreading the roots out, and placing the strongest ones facing the prevailing winds.

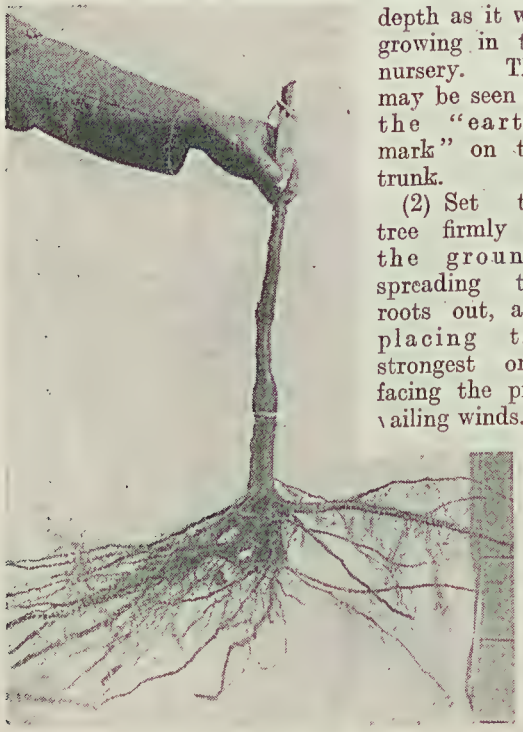


Fig. 23.—Before pruning roots.

(3) Make sure that the hole is large enough for the roots to fit in, but not too large.

(4) Put a spadeful or two of new topsoil in the bottom of the hole; place the tree in position; shovel more earth over the roots; shake the tree up and down a little to allow the soil to fit all round the roots; firm the soil with the feet, and finish filling in the hole, leaving the soil loose on top.

Fig. 24.—Roots pruned ready for planting.

Cultivation.

Of the various factors that make for success in cherry growing, cultivation is one of the most important. If this work is not continued after the fruit is harvested, the trees cease growing earlier than would otherwise be the case.

Cultivation, in addition to its value in conserving moisture in the soil, makes available food that would not otherwise be used by the tree, and also lets air and sunlight into the soil.

The cherry tree, being an early bloomer, the first ploughing should be performed early in the spring, followed by one or more cultivations when picking is over. But cultivation should cease early enough to permit growth to cease, and the wood to ripen well, before winter. However, this does not apply to young non-bearing trees, and, in their case, cultivation should be performed over as long a period as possible, so as to promote vigorous and continuous growth.

Pruning.

The cherry requires less pruning than most other fruit trees, and after the first three years should not be pruned, except to remove useless sub-leaders, while at the same time encouraging all low growth that will assist to build up the tree. If sub-leaders are not removed, the top of the tree becomes dense, and has a tendency to produce more fruit at the top than at the

Fig. 25.—Bedford on Mazzard—before pruning.

bottom. This is due to the lower buds not receiving sufficient sap. When the tree is in full bearing, little attention to pruning is needed for some years unless to remove superfluous limbs. In pruning a young tree, the aim should be to secure as many low-branched leaders in the first few years as possible.

It should be remembered that the pruning the cherry tree receives in its first years has a great influence on its future. The shaping of the young tree also is of importance, as attention in the matter of spacing limbs will repay the grower by making subsequent pruning easier.

Trees worked on Kentish stock will not stand the same amount of pruning as those on the Mazzard or Mahaleb. Hard cutting on the former tends to start gumming, and frequently causes the affected limb or the smaller growth to die. Trees on Kentish stock which have been pruned regularly actually decrease rather than increase in growth each year. Should gumming be observed, it is advisable to slit the bark on the affected limb with a sharp knife to let the gum out.

It should be remembered that heavy pruning encourages growth and prevents bud formation. Lighter pruning has the reverse effect. Cherry trees generally resent pruning, and consequently judicious cutting is essential.

An interesting experiment is being conducted with two young Bedford cherry trees, to test the merits of pruning as opposed to no pruning. Two trees were planted side by side. One (Fig. 27) was pruned for three years, and then allowed to remain unpruned. It is now the better-shaped tree, and is beginning to develop fruit spurs evenly. The second tree (Fig. 28), which was never pruned, is now the stronger tree, and produces three times the quantity of fruit of the other. It has every appearance of growing to be a good tree. In the first year it grew 4 inches, in the second 18 inches, and from then onwards began to develop lower limbs. This tree had only four limbs when planted, and is now five years old. This practice of leaving the young tree unpruned is not recommended, however, and it is advisable to prune for a few

Fig. 26.—Same tree as in Fig. 25—after pruning.

Fig. 27.—Bedford cherry, pruned for three years, then left unpruned.

years to shape it. Also, it is desired to emphasize that all trees would not make the growth made by these trees.

Manuring.

No experiments in the manuring of cherries have been carried out in Victoria, and our manuring practices are based upon general observation only. Cherries undoubtedly need good deep friable soils, well supplied with humus, to produce their best growth, and, where they are grown on poorer land, soil infertility often appears to be a limiting factor.

The supply of humus to such soils is of paramount importance, and the grower should see that plenty of green stuff is ploughed under yearly. Where practicable, a green manure crop should be sown early in autumn, and ploughed under about one month before the trees blossom. Where leguminous crops will grow well, a mixed crop of tick beans and field peas—three-quarters of a bushel of seed of each, and 1 to 2 cwt. of super. to the acre—is recommended. In some of the southern Victorian districts, where the soils are generally more acid than is the case elsewhere, oats, sown at the rate of 1 to 2 bushels per acre, with superphosphate, will give much better results than the peas and beans.

Where it is not possible to sow a green manure crop, and where the natural herbage is not making vigorous growth, it should be encouraged by top-dressing with either sulphate of ammonia, at the rate of 1 cwt. per acre, or superphosphate, using 2 cwt. per acre, applied in early autumn. A simple trial will show which of these manures is preferable. The ground should not be cultivated after this application of fertilizer. Where stable manure is available, it should be used freely.

Artificial fertilizer may not be necessary for spring application where the trees are growing satisfactorily. When tree growth or leaf colour is not satisfactory, however, growers are advised to apply 3 to 4 lb. of the commercial 2 + 2 + 1 complete manure, or its equivalent, two to three weeks prior to blossoming, and to work it under as deeply as possible soon after spreading.

In certain cases sulphate of ammonia alone, at the rate of 3 to 4 lb. per tree, will give better

Fig. 28.—Bedford cherry unpruned since planting.

results than the complete manure, but as no hard and fast rule can be laid down at present small trials of these two fertilizers should be made before finally deciding upon the manurial propramme.

Resoiling, that is applying virgin soil from a neighbouring field, is sometimes practicable; and when it can be carried out at reasonable cost it is to be highly recommended. At Beechworth one large cherry orchard receives a regular dressing of new top-soil from the adjacent forest, and the results have been very successful.

Fig. 29.—Second year before pruning.

Liming is to be recommended only when the natural herbage is of a type such as sorrel indicating pronounced soil acidity. Unless the lime has a markedly beneficial effect upon the natural herbage it is not likely to be of great advantage to the trees. Here again a preliminary trial by the grower is easy to carry out, and should precede wholesale liming. Either burnt lime or ground limestone is suitable for application.

Fig. 30.—Same tree—after pruning.

Blooming.

Cherries have a comparatively long blooming period of about two weeks, or sometimes longer. Weather conditions during and just preceding blooming have a marked influence on the bloom, warm weather being favorable to an abundance of pollen of good germinability, while cold weather is apt to have the opposite effect. Also, continued rain during the blossoming period will prevent the setting of the fruit. This was noticeable in many Victorian orchards during the wet spring of 1932.

Immediately after petal-fall fruit begins to form, but during the following two or three weeks, a big percentage of these fruits falls. If this did not occur, the tree would be overcropped, and the fruit small. Following the first drop there is usually a second about two weeks later.

Pollenization.

Sweet cherries are now known to be incapable of producing good crops of fruit with their own pollen only, or that from trees of their own variety, and, consequently, plantings should be made with a view to securing different varieties which will flower at the same time.

Fig. 31.—Showing shaping of young tree at third pruning.

The bee is undoubtedly the best carrier of pollen, and at least one hive to the acre is advisable.

The following points in relation to pollenization are important:—

(1) Coincidence in blooming in regard to the varieties to be planted.
(2) Germinability of pollen produced by these trees.
(3) Amount of pollen produced by pollenizer.
(4) Commercial value of pollenizer.

Fig. 32.—3-year-old Florence—pruned for two years and now being left unpruned.

Experiments in pollenization in cherries are now being carried out by the Department of Agriculture, and in a few years, information on this matter will be available.

If no provision has been made in regard to securing coincidence of blooming of different varieties, one tree in every eight should be worked over to the variety required, or a limb or two on each tree could be grafted with the additional variety. Another method of pollenization is to place small branches while in bloom in vessels of water, and distribute them among the trees.

Experiments have shown that little reliance can be placed on agencies for the inter-pollenization of fruit tree blossoms, other than the bee. The carriage of pollen from flower to flower by other insects, or the wind is negligible.

In grafting a limb into a tree for pollenization purposes, care should be taken to ensure that the grafted limb is placed in such a position as to be easy of access to sunlight and bees, and also to allow it ample room, otherwise it may become stunted.

Picking.

The picking of cherries at the proper time, that is when they have reached the correct degree of ripeness, is of great importance, as fruit picked before it is properly ripe is not as saleable as that picked at the correct time, and frequently has a bad effect on cherry sales generally. Fruit picked too soon is not of the quality of that picked when ripe. In addition it is smaller, and if picking were delayed for a few days the increased growth of the fruit would compensate the grower for any difference in the price between the early and later fruit. At the same time the better quality fruit would be more satisfactory to the consumer.

Usually cherries ripen unevenly, and consequently all of the picking should not be done at the one time. The fruit remaining after each picking will increase in size, and acquire a good colour. The main considerations to remember in picking cherries, are:—

(1) Pick the fruit with the stems on.

(2) Care should be taken that the fruit spurs are not pulled off or broken. This is important as these spurs may never be replaced. Gumming also may occur.

(3) Never pick cherries when they are wet with rain or dew.

Special attention should be paid to grading the fruit when packing, and also to packing the top layer evenly. This gives the consignment a decidedly attractive appearance, and leads to increased prices.

Fig. 33.—Burgsdorf—very light pruning.

Mallee Research Station

Experiments at Walpeup

The following report has been compiled in connexion with the official opening of the Mallee Research Station at Walpeup on Friday, 3rd November, 1933.

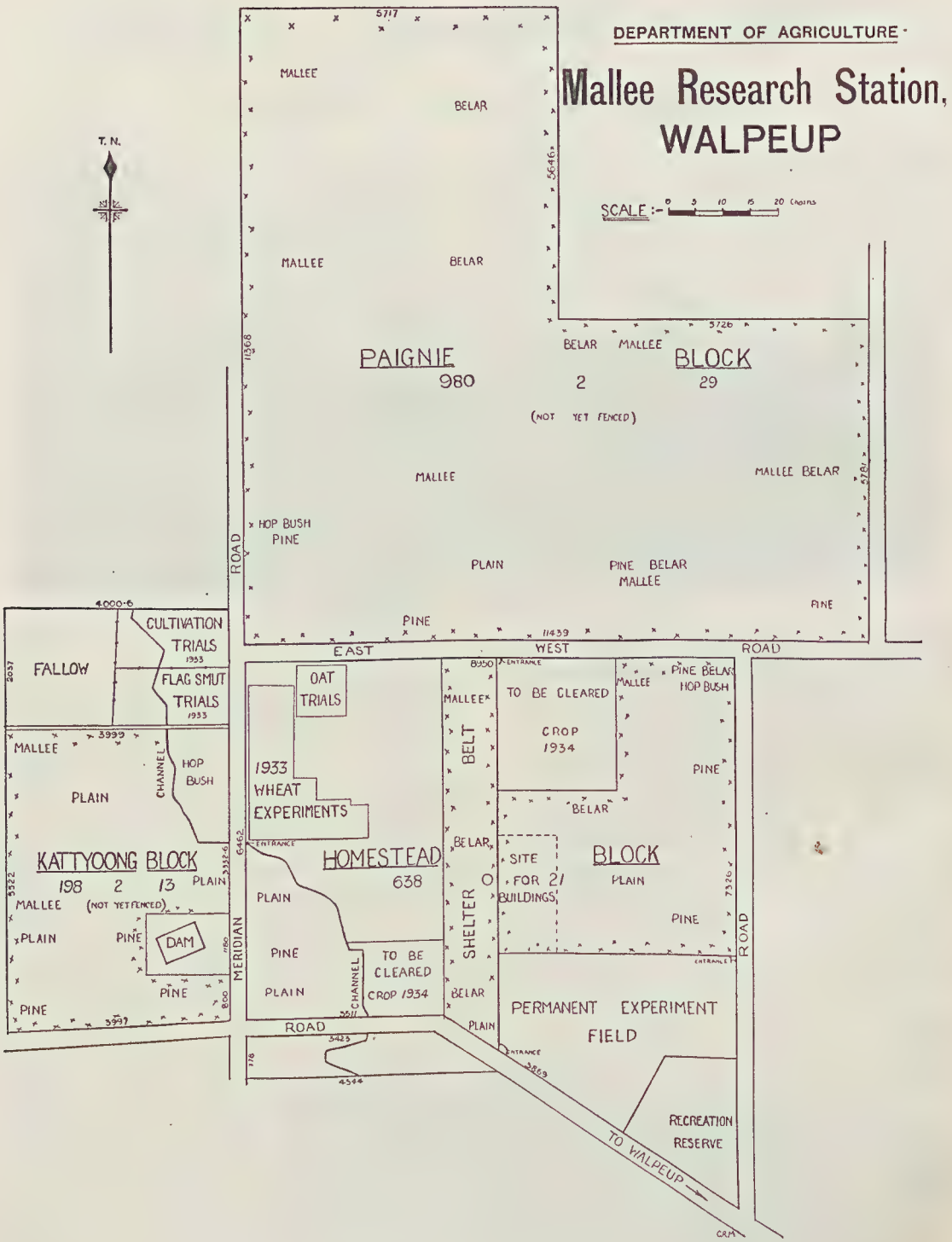
Visitors inspecting the experimental plots.

THE establishment of the Mallee Research Station at Walpeup in 1932 was made possible by the decision of the Government of the day to allot for that purpose portion of the Wheat Marketing Fund. This fund consisted of moneys derived from the sale of Roumanian bonds accepted in payment for wheat delivered during the war, and expenditure from the fund was limited by Act of Parliament to educational, scientific, or experimental work for the promotion of wheat production. Early in 1932 it was determined to operate the fund, and, having regard to the fact that it was derived from the whole of the wheat-growers of the State, it was considered that it should be used to develop a comprehensive scheme of wheat research designed to benefit all wheat-growers and having particular reference to the breeding of varieties of wheat more suitable to the various districts. The Government, therefore, adopted a proposal that the accumulated interest in the fund should be used for the erection and equipment of a scientific wheat research laboratory at the State Research Farm, Werribee, and the establishment of a central Mallee Research Station.

The decision to establish a research station in the Mallee was influenced by the fact that the Wimmera, the Goulburn Valley, and the North-East all had their State institutions, but the Mallee, comprising 11,000,000 acres, or one-fifth of the State, had no permanent institution for research work at which a resident staff could attack the problems.

The policy was adopted of locating the experiment station at the geographic and climatic centre of the Mallee, and of supervising the associated district plots by the staff resident at the central institution. Before adopting Walpeup, the advantages and disadvantages of twelve areas in various parts of the Mallee were reviewed. The factors in favour of Walpeup were—(*a*) its central situation; (*b*) climatic conditions there are average, avoiding the region of highest rainfall in the south and the region of lowest and most unreliable rainfall in the extreme north-west; (*c*) the soil was virgin, and comprises a range of five important types; and (*d*) portion of the area had been under experimental plots for a number of years.

Accordingly an area of 1,986 acres of Crown land 1½ miles from the Walpeup township was selected and permanently reserved for use as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FLAG SMUT TRIALS 1933
OAT TRIALS
1933 WHEAT EXPERIMENTS
HOMESTEAD
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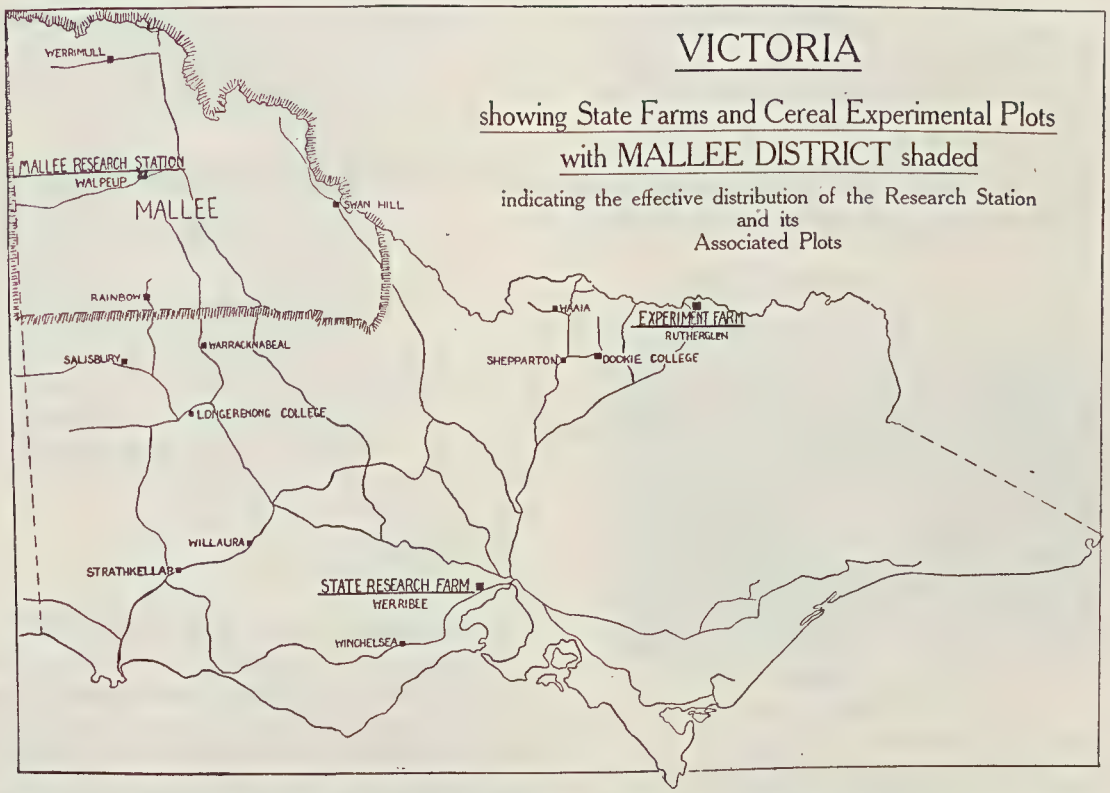


an experiment station by the Department of Agriculture. It is intended that the station will serve as a centre for research and investigation into wheat-growing and allied problems in the Mallee, and that it will be supported by experimental plots in other appropriate districts throughout the Mallee, similar to those which have been conducted by the Department at Carwarp, Walpeup, Manangatang, Cowangie, Swan Hill, and Rainbow. Last year a comprehensive series of tests was successfully inaugurated at Werrimull, in the Millewa, to replace the plots previously conducted at Carwarp on the property of the late P. G. Stewart, M.H.R. The Mallee, therefore, is served by a central station at Walpeup, with district plots at Swan Hill, Werrimull, and Rainbow, where results obtained at Walpeup will be confirmed and demonstrated under local conditions. Further plots of this nature will be established as opportunity offers.

The work of development so far has consisted chiefly in clearing and placing under crop some 250 acres of virgin land. In 1932, 100 acres of land was fallowed, 46 acres being utilized for plots this year, while 60 acres was sown to oats. In addition, approximately 150 acres has been sown to wheat. Thus the experimental work has been extended considerably beyond the limits of the last few years.

During the coming year it is proposed to complete the clearing of the homestead block of 638 acres, and to bring as much as possible of this area into production in the near future. The bulk areas will be used for the multiplication of the most suitable varieties of wheat and oats, in order that pedigreed seed may be available next year. For the 1934 season seed wheat of Ranee 4H and Ghurka will be available from the present season's crops.

No farm buildings have been erected as yet, but it is proposed to build in the near future a barn for storing produce and for use in plant-breeding work. Water supply also will receive attention, and, in addition, quarters will be erected for the staff. The officer in charge of the Station is Mr. L. H. Hore, B.Agr.Sc.

The 1933 Season.

The prolonged dry spell at the beginning of the year delayed seeding, and the early-sown plots were put in under very dry conditions during the first few days of May. Since the break of the weather in May, the rainfall has been somewhat light, but timely falls have resulted in good growth.

Following is the monthly rainfall received to the end of September:—

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
133	0	15	11	170	29	148	138	154

Total for nine months—798 points.

The average rainfall for the whole year at Walpeup for the past 21 years is 1,329 points, of which amount 1,006 points had fallen by the end of September.

Summary of the Tests.

Prior to 1932, the experiments at Walpeup had been confined to comparisons of wheat and oat varieties and manurial trials, sown during May. As the time of sowing has a considerable effect on the yields obtained, it is essential that the optimum time of sowing for each variety should be determined. For this reason the variety trials now are sown at three different times. The experiments this year include—

A. *Experiments with Wheat (on fallow)*—
- (1) Manurial trials, sown early, mid-season, and late.
- (2) Variety trials, sown early, mid-season, and late.
- (3) Rate of seeding trials, sown early, mid-season, and late.
- (4) Time of sowing trials, sown early, mid-season, and late.
- (5) Cultivation trials.

B. *Experiments with Oats (on fallow)*—
- (1) Variety trials—(*a*) for hay; (*b*) for grain.
- (2) Manurial trials.
- (3) Rate of seeding trials.

C. *Trials of New Selections and Crossbreds*—
- Stud plots and selection rows and plots of new selected and hybrid varieties of wheat, oats, and barley.

D. *Flag Smut Investigations*—
- (1) Trials to determine the susceptibility of standard and new varieties to the wheat disease, flag smut.
- (2) Trials to determine the effect of various manures and other factors on the infection of flag smut.
- (3) Trials to determine the effect of the disease on the yield of different wheat varieties.

E. *Investigation into Possible Fodder Crops for the Mallee*—
- (1) Lupins.
- (2) Salt-bush.

Layout of the Experiments.

In order that varying soil conditions may not affect the comparisons between plots, it has been found advisable to replicate or repeat each plot in a trial. Each treatment or variety is sown once in a block of plots, and the whole block is then repeated at least four times. The method is termed the Randomized Block system. Not only is the average yield of the plots of each treatment more representative of the true yield of that treatment, but the method also enables one to obtain a measure of the variation between the plots. The extensive

A Field Day Gathering.

nature of the work performed this year is indicated by the following summary of the plots sown in each section:—

Wheat plots (manurial, variety, &c.)—457 plots.
Oat plots (variety, manurial, &c.)—29 plots.
Stud rows—750 rows.
Flag Smut Investigations—
Drill rows—40 plots.
Hand rows—193 rows.

In addition to the trials outlined above, it is proposed in the near future to lay down a Permanent Experiment Field, in which various types of rotations, manures, and cultivation trials will be sown on permanent sites. In order to determine the best and most uniform sites on this field, the whole area has been sown to a bulk crop of Ranee 4H wheat this year. This crop will be harvested in separate sections as a Uniformity Trial. Opportunity has been taken to carry out also an exact survey of the timber and vegetation on this area before it was cleared. With the help of a similar chemical soil survey it is hoped that valuable correlations between native vegetation, soil analysis, and final yield of the wheat crop will be possible. A broad-scale soil survey of the whole farm will be undertaken as time permits.

RESULTS OF EXPERIMENTS.

Wheat Manurial Trials.

This year's manurial trials with wheat were sown in three sections—(*a*) Early (1st May); (*b*) mid-season (22nd May); and (*c*) late (13th June). In 1932 the trials were sown in two sections only—(*a*) sown early (26th April) and (*b*) sown late (10th June). The results obtained are set out in Table I., which shows clearly the marked response to superphosphate.

TABLE I.—WHEAT MANURIAL TRIALS, 1932.

—	Sown Early.	Sown Late.
	bus./ac.	bus./ac.
No Manure	23·7	15·8
Super. 30 lb. p.a. ..	30·0	20·9
,, 60 ,, ..	34·0	23·7
,, 90 ,, ..	34·1	24·3
,, 120 ,, ..	34·8	25·4

The results of the manurial trials at Walpeup over the last eight years, which are set out in Table II., show the increased returns that may be expected from the various applications of superphosphate. From these results it appears that, under conditions similar to those at Walpeup, the most profitable dressing for wheat on fallow is about 90 lb. per acre.

A plot of Ghurka, one of the leading wheat varieties.

TABLE II.—WHEAT MANURIAL TRIALS, AVERAGE RESULTS FOR EIGHT YEARS.

Manure Per Acre.	Average Yield for 8 Years.	Increase Due to Super.	Value of Increase at 2s. 6d Per Bus.	Cost of Super. at £5 Per Ton.	Extra Return Per Acre Due to Super.
	bus./ac.	bus./ac.			
No Manure ..	14·5	..	..	..	..
Super. 30 ..	17·5	3·0	7 6	1 4	6 2
,, 60 ..	19·1	4·6	11 6	2 8	8 10
,, 90 ..	20·1	5·6	14 0	4 0	10 0
,, 120 ..	20·3	5·8	14 6	5 4	9 2

A crop of Rajah at the Mallee Research Station, Walpeup.

Wheat Variety Trials.

The variety trials were sown on fallow in three sections—early, mid-season, and late. The rate of seeding was 60 lb. per acre, with superphosphate at the rate of 90 lb. per acre. In addition to the wheats tested last year, several new varieties were obtained from other States, including Bobin, from New South Wales, and Bencubbin, from Western Australia. These varieties are yielding well in their respective States, and it will be of interest to observe how they compare with Victorian wheats.

The results of the variety trials last year are shown in Table III.

TABLE III.—WHEAT VARIETY TRIALS, 1932.

—	Sown Early. (26th April)	Mid Season. (16th May)	Late. (10th June)
	bus./ac.	bus./ac.	bus./ac.
Ghurka	42·9	37·5	31·1
Ranee 4H ..	37·9	34·8	31·8
Sepoy	36·5	35·2	31·0
Free Gallipoli ..	36·2	33·3	27·6
Currawa	34·9	34·1	24·8
Joffre	32·8	33·4	24·2
Nabawa	29·1	32·3	28·0
Rajah	22·3	31·5	26·7

The average results of variety trials, which have been conducted at Walpeup for the past seven years (Table IV.), show that the best returns for this district have been obtained from Sepoy and Ghurka for early sowing, and Ranee 4H for later sowing.

TABLE IV.—WHEAT VARIETY TRIALS—AVERAGE RESULTS FOR SEVEN YEARS.

Sepoy	21·4	bush. per acre
Ghurka	20·8	„ „
Ranee 4H	20·2	„ „
Currawa	20·0	„ „
Free Gallipoli	19·9	„ „
Rajah	19·3	„ „

In the trial of new crossbred wheats (Table V.), the control varieties, Ranee 4H and Free Gallipoli, were outyielded by four new crossbreds, but these tests will have to be repeated for at least three years before definite conclusions as to the worth of these new varieties can be drawn.

TABLE V.—NEW CROSSBRED TRIALS (SOWN MID-SEASON).

Variety.	Yield.
	bus./ac.
Currawa x Ind. E. x Telfords	37·5
Major x Ranee	37·2
Imp. Gluyas x Ranee	37·0
Mac's White x Glencope	35·0
Ranee 4H	35·0
Ranee x Rajah	34·3
Free Gallipoli	33·4
Canberra x H. Fed.	32·2

Time of Sowing Trials.

In addition to having all the major trials sown in three sections, a set of plots sown early (1st May), mid-season (22nd May), and late (13th June) was introduced this year, the variety used being Ranee 4H, at 60 lb. per acre, with 90 lb. superphosphate. The advantages of early seeding are demonstrated by the figures from the various trials. In all cases the yields of the early-sown plots are definitely higher, and growers should note the increased returns obtained in this way.

Rate of Seeding Trials.

This year the following rates of seeding are being tested, the experiment being repeated for three times of sowing, early, mid-season, and late:—30 lb., 45 lb., 60 lb., and 75 lb. per acre

Wheat Variety Trials, Mallee Research Station, Walpeup.

respectively, the variety used being Ranee 4H. The results of similar trials in 1932 are shown in Table VI. In this case the plots were sown with Free Gallipoli wheat, with superphosphate at the rate of 90 lb. per acre.

TABLE VI.—RATE OF SEEDING TRIALS.

Rate of Seed.	Early.	Mid. Season.	Late.
45 lb. p.a. ..	33·3	32·1	27·9
60 lb. p.a. ..	34·0	32·7	28·9
75 lb. p.a. ..	35·0	33·1	29·7
Average Results ..	34·1	32·6	28·8

Cultivation Trials.

Cultivation trials were commenced at Walpeup for the first time this year, the following cultivation systems being tested:—

(*a*) Deep fallow, ploughed 5 inches, mid July, cultivated and sheeped in standard manner.

(*b*) Normal fallow, ploughed 2½ inches, mid July, cultivated and sheeped in standard manner.

(*c*) Late fallow, ploughed 2½ inches, late September, cultivated and sheeped in standard manner.

(*d*) Sheeped fallow, ploughed 2½ inches, mid July, not cultivated till autumn.

(*e*) Neglected fallow, ploughed 2½ inches, mid July, neither cultivated nor sheeped.

The results of four years' experiments at Carwarp (Table VII.) afford definite evidence of the value of early fallow and efficient though economic cultivation of the fallow. The yields from land fallowed in July have been more than double those obtained on non-fallow, and appreciably higher than those from adjacent land fallowed in October, or from neglected fallow. Apparently no benefit is to be obtained by summer fallowing in similar Mallee areas.

TABLE VII.—CULTIVATION TRIALS, CARWARP.

(Average yield, 4 years, 1924-28.)

Summer fallow (standard working)*	11·7	bush. per acre
Winter fallow (July standard working)	11·7	,, ,,
Winter fallow (dry worked) ..	9·2	,, ,,
Winter fallow (neglected) ..	7·5	,, ,,
Late fallow (October) ..	9·4	,, ,,
Non fallow	5·1	,, ,,

* Standard working—Worked 3 to 5 times according to rainfall.

Oat Variety Trials.

An extensive series of oat variety trials was sown on May 5th on fallow with 55 lb. of seed and 40 lb. of super. per acre. The experiment is divided into two sections, one portion being cut for hay, and the other stripped for grain.

The varieties sown in their order of maturity are Palestine, Burt's Early, Mulga, Belar, Gidgee, Guyra, Dawn (formerly known as Sunrise Selection), Lachlan, Wild Oat x Ruakura x Kanota W5011 K9-3-1, Wild Oat x Ruakura x Kanota W5011 K6-3-1, and Algerian.

The results of the Oaten Hay tests for 1932 showed that the early varieties, such as Mulga, Dawn, Guyra, and Gidgee were a definite improvement on Algerian. The yields obtained are shown in Table VIII.

TABLE VIII.—OATEN HAY VARIETY TRIAL, 1932.

Mulga	51·5	cwt. per acre
Dawn	50·0	,, ,,
Guyra	48·8	,, ,,
Gidgee	47·4	,, ,,
Lachlan	46·1	,, ,,
Belar	45·5	,, ,,
Burt's Early	45·4	,, ,,
Algerian	42·0	,, ,,
Palestine	41·7	,, ,,

Unfortunately, the grain tests were ruined by high winds in October, and many of the plots lodged and shed badly. The average returns from the Carwarp plots for two years (Table IX.) show that these same varieties give considerably higher grain yields than Algerian, and can definitely be recommended for use on at least portion of the area usually sown with Algerian.

TABLE IX.—OATEN GRAIN VARIETY TRIAL, CARWARP.

(Average, two years, 1930-31.)

Sunrise	23·9	bush. per acre
Gidgee	23·2	,, ,,
Mulga	22·8	,, ,,
Palestine	21·7	,, ,,
Dawn	21·6	,, ,,
Guyra	20·7	,, ,,
Belar	18·6	,, ,,
Algerian	13·9	,, ,,
Lachlan	10·2	,, ,,

In addition to the above tests, plots have been sown this year to test various rates of seeding with both Algerian and Mulga varieties. Three rates of seeding are being compared, viz., 30, 50, and 70 lb. per acre.

Trials of New Selections and Crossbreds.

In 1932 a commencement was made with the work of raising new and improved crossbreds and selections of wheat, oats, and barley. From their early stages, known as the F1, F2, F3, and F4 generations, the more promising hybrids and selections will be taken to the selection rows and plots. An opportunity will thus be given the plant-breeder to examine the new varieties growing under Mallee conditions. In this way the various factors which go to make up a prolific variety will be studied at an early stage in the life of the new crossbred or selection, and those showing weakness of any description will be discarded.

A large number of crossbreds and selections is included in these stud plots.

Flag Smut Investigations.

This experiment is part of a new set of investigations commenced at several centres, including Walpeup, Werribee, Shepparton, Warracknabeal, Rutherglen, and Longerenong. This year the scope of the experiments at the Mallee Research Station has been considerably extended to investigate the effect on the disease of many factors, such as time and depth of sowing, pickling, cutting back (or feeding off), and the application of various fertilizers. In addition, an accurate yield trial, sown with infected and clean seed of Nabawa, Ghurka, Federation, and Free Gallipoli, is included to determine the effect of the fungus on the yield of both "resistant" and "susceptible" varieties.

Although infection in the field generally takes place from the spores or seeds of the disease present in the soil, experimental tests

Portion of the non-infected plot of Free Gallipoli in Yield Trial, Flag Smut Investigations, 1933.

are made by dusting the grains of the varieties to be compared with spores gathered from diseased plants in the previous season.

Wheat varieties differ in the degree of their susceptibility to flag smut, and one of the most promising means of control lies in the direction of breeding varieties which are resistant to the disease. Hence observations on the percentage infection of the disease in rows of the wheat varieties in general cultivation is most valuable.

The varietal susceptibility trial to date has revealed a very promising group of varieties and crossbreds which are comparatively resistant to the organism. The varieties which have been tested may be divided into the following groups in accordance with their reactions to the disease:—

Very susceptible	Ranee x Gallipoli, Waratah, Federation, Free Gallipoli, Turvey
Susceptible	Ranee 4H, Ranee x Rajah, Major
Moderately resistant	Sepoy, Joffre, Currawa
Resistant	Ghurka, Rajah x Gallipoli, Nabawa

Pickling with copper carbonate resulted in a very appreciable decrease in infection as under:—

Results of Pickling Tests, 1932, showing the Percentage Flag Smut Infection Obtained.

Variety.	Percentage Infection. Pickled.	Unpickled.
Federation ..	2.3 ..	25.3

View of the plot of Free Gallipoli infected with flag smut—Yield Trial, Flag Smut Investigations, 1933.

Pickling the seed with copper carbonate does not give complete control in the case of heavy seed-borne infection, and has no effect upon

spores in the soil. When the soil has become heavily infected with the disease, the most satisfactory means of control consists in fallowing the infected area, and sowing one of the varieties included in the resistant section above. In this regard, Rajah x Gallipoli, a prolific new crossbred, promises to be of great value.

Feeding-off a crop on an infected area is undesirable, as tests have shown that under these conditions the disease causes greater damage.

Forage Crops.

Great interest has been shown in the development of forage plants for the Mallee areas. Last year interesting information was gained as to the best methods of grazing oat crops. Although it was not found possible to include these trials in the plan for the current year, it is intended that the experiments shall be continued in the 1934 programme.

In addition to the value of cereal crops for this purpose, attention has been turned recently to the development of other types of forages. Great success has been attained in the drier portions of Western Australia with Blue Lupins, which have been sown down to considerable areas in that State. Seed was imported into Victoria at the beginning of this year, and plots have been sown down at Walpeup to determine its suitability to Victorian Mallee conditions.

Similar interest has been shown in the development of various species of saltbush as a fodder, and plots of one of these, *Atriplex semibaccatum,* also have been sown this year to enable the possibilities of this plant to be observed.

Typical timber on the Mallee Research Station, prior to clearing.

FIELD DAYS ARRANGED.

Arrangements have been made for officers of the Department of Agriculture to conduct field days at the experimental plots in the following centres:—

Cereals.	Pastures.
Mallee Research Station, Walpeup, 3rd November (official opening)	Toora (J. Kroezen), 1st November
Experiment Farm, Rutherglen, 9th November (cereals and pastures)	Yarragon (B. Olsen), 3rd November
Rainbow (A. West), 14th November	Mirboo North (R. Barrand), 9th November
Willaura (J. Shalders), 17th November	Pasture Research Field, Burnley Gardens, 10th November
Dookie Agricultural College, 22nd November	Warragul (C. Tyssen), 13th November

Summer Fodder Crops

Maize, Millet and Sorghums

By W. J. B. McDonald, Assistant Inspector of Agriculture

PROBABLY the most striking development in Victorian agriculture during recent years is the increased attention being devoted to the establishment and management of pastures. As a result many districts, particularly in the moister and irrigated portions of the State, are carrying greater numbers of stock than ever before.

While this greater attention to pastures undoubtedly has increased to a considerable degree the total amount of feed produced during the year, it has not succeeded as yet in distributing the producing power of pasture land evenly throughout the year, since we still get a flush of feed at one season and a pronounced shortage a few months later. Although it is certain that by using in a pasture mixture grasses and clovers that reach their maximum development at different periods of the year, the useful life of the pasture in any one season is increased, we still have a definite seasonal ebb and flow in the amount of feed produced.

As the carrying capacity of his property is raised, so the farmer naturally increases the number of his stock. Should the period during which there is a normal shortage of natural feed be prolonged through unfavorable weather conditions (as it has been during the past season), the farmer who is relying on pasture alone for his stock feed is in trouble immediately, his difficulties being aggravated by the increased number of stock for which he must find feed. Pasture improvement is a necessary step towards increasing carrying capacity, but it must be remembered that, under Victorian conditions, and especially in unirrigated districts, pastures must be supplemented by some cultivated fodder crop if the supply of feed throughout the year is to be maintained at a level adequate to the needs of the stock carried.

The kinds of crop suitable for supplying this need may be grouped into two main classes—winter growing crops like oats or barley, and summer crops like maize or millets. Summer-growing fodders are useful more particularly in supplying a bulk of succulent feed during the dry months of late summer and early autumn, or they can be cut for hay or ensilage, in these forms providing a reserve of fodder that can be utilized when conditions most demand it. Every dry season or period of drought is followed by serious losses in our flocks and herds, due mainly to a lack of fodder reserves. Immediately the natural grasses begin to dry up there is a falling off in the milk flow of all milk-producing animals, be they dairy cows, lambing ewes, or any other animal mothering its young. A succulent ration is essential to a prolific milk yield, and summer fodders provide this succulence when it is most needed. Although there may be dry feed, ample for the maintenance of a beast, this is not sufficient to maintain the flow of milk.

A well-grown crop of maize.

The choice of a fodder crop will depend on its suitability to the district, its cost of production, its ease of handling and the particular purpose for which it is required. For instance, maize is not an ideal crop for feeding off purposes, whereas it probably remains unsurpassed in many districts as a silage crop; while sudan grass could quite easily fill the dual role of a soiling or feeding off crop which later in the season could be allowed to form seed and then be cut for hay. Among the summer-growing crops which flourish over a considerable portion of the State are lucerne, maize, millets, sudan grass, and the sorghums generally.

Although lucerne has long been regarded as the "King of Fodders," it is not proposed to deal with it here at any length. It is essentially different from the other crops enumerated, in that it is a perennial, usually sown on well-graded land under irrigable conditions and, when once established, remains in continued possession of a field for a period of years—perhaps ten or more. It thus forms a permanent part of the farming system. On the other hand, maize, sorghums and millets sown for fodder purposes, are annuals, sown under either irrigated or natural rainfall conditions, and almost invariably regarded as a catch crop on which a great deal of care and attention is not warranted. This particular attitude toward summer fodders is an unfortunate one.

Before leaving lucerne, however, it may be pointed out that there are areas where this crop can be grown successfully under natural rainfall conditions. Even if the summer fall is not sufficient to give sufficient growth for haymaking, useful grazing is provided. Planted under these conditions, autumn sowing generally is preferable as the winter rains enable the young plants to become established before the hot weather sets in. From 10 lb. to 12 lb. of seed per acre should be sown on a well-prepared seed-bed. During the first season stock should not be allowed to graze the young plants, as a severe grazing at this stage would tend to destroy the completeness of the stand. When grazing an established field of lucerne, the greatest benefit is obtained by feeding it off rapidly and completely. It does not pay to allow a few head of stock to wander at will over a large area of lucerne, as they eat only the youngest and most palatable portions, the older growth being left standing until eventually it becomes woody and unpalatable.

Annual Fodder Crops.

It is unfortunate that the annual summer fodder crops as a whole do not hold in Victorian agriculture the place to which their value as an individual and national asset entitles them. In the irrigation districts, for instance, we find that whereas the acreage under lucerne shows a gradual yearly increase, the area sown to summer fodders has declined from 37,000 acres in 1925 to 29,000 acres in 1932, after having reached a peak of 59,000 acres in 1929. This same trend is exhibited over the whole of Victoria, and possibly is accounted for partly by the fact that the production of fodder from a permanent pasture is achieved at less labour cost than is the case where a cultivated summer crop is grown. Another important factor is that in many instances fields that once carried the most prolific summer fodder crops now carry the best pasture, and a farmer naturally would be loth to plough it up. It is suggested, however, that it may not be good policy to exclude from cultivation all land which has proved capable of producing a prolific summer crop.

Maize.

Although maize for fodder has been classed in the same category as the millets and sorghums, it cannot be regarded as an alternative crop to Japanese millet and sudan grass, the two most popular summer fodders. Maize has a special place in the farming system as a crop designed for ensilage. As maize does not re-grow after being fed off, it cannot be regarded as a good grazing proposition, and, in its early stages particularly, it is very deficient in milk-producing elements. As it approaches maturity so its nutritive value increases, but even so if stock be fed on cut maize it is necessary that their ration be supplemented by some form of concentrated fodder. Maize, however, is excellent material with which to form the bulk of a composite feeding mixture, and feeding mixtures are resorted to when practically all growth is at a stand-still, that is, in the winter months. At this time of the year maize ensilage is a wonderful asset, especially to the dairy-farmer. This probably is the ideal form in which to use the maize crop, which is capable of producing an enormous bulk of fodder per acre. Maize is in its most nutritious state when the grain is in the milky condition, and it is at this stage that it should be cut for ensilage. It thrives best in rich fertile soils

under warm, moist conditions. It will not stand frost or thrive under droughty conditions. About 28 lb. of seed per acre should be sown in rows from 18 to 30 inches apart according to conditions. Suitable varieties for fodder are Hickory King and Flat Red, or, if very early crops are desired, some of the flint varieties such as Longfellow or Ninety Day.

Japanese Millet and Sorghums.

Japanese millet and sudan grass are the most popular and useful summer fodders for feeding off purposes. Japanese millet is particularly valuable for providing early grazing. It makes a rapid and prolific growth, being ready for feeding off from six to eight weeks after planting. The crops should be grazed when it is about 6 inches high, and on no account should it be left to grow more than a foot high, as beyond this stage its nutritive value as a grazing proposition decreases. When fed off in its early stages Japanese millet is an excellent milk producer, and to the dairy-farmer probably is the most useful fodder we have. It is grown widely throughout both southern Victoria and the northern irrigation areas.

Sudan grass is probably the most useful member of the sorghum family. It has a special value in being more drought-resistant than the fodders previously discussed. It is this feature which gives it preference over Japanese millet in certain areas. It is particularly valuable where the summer rainfall or irrigation is limited or uncertain, or where the soil is liable to dry out readily.

The sorghums as a family are more resistant to unfavorable weather conditions than either Japanese millet or maize. In the northern irrigation districts Japanese millet requires irrigating every week during the hottest months of the year. Where water is available at regular and frequent intervals, the millet could not be surpassed as a fodder, particularly on self-mulching loams which do not form a surface crust. In districts where the summer rainfall is liable to be irregular and rather light, or where the supplies of irrigation water are available only at irregular intervals, a member of the sorghum family is the safer crop to plant.

Sudan grass probably is most popular in the northern irrigation areas and in the Upper Murray districts. It is a rapid grower which shoots freely and provides a big bulk of succulent feed palatable to all stock. It can be fed regularly throughout the summer months, and if left to run to flower toward the end of the season a large bulk of good quality hay can be obtained. It can be cut with the reaper and binder, and should be cured and stooked in the normal fashion.

All sorghums should be grazed with caution as there is a tendency toward prussic acid poisoning if grazed at certain stages of development. Sudan grass is the least liable to effect any injury through this cause, and a reasonably pure stand can be safely grazed at any period of growth except after a check due to frost or droughty conditions. The bulk of opinion favours grazing it when between 18 inches and 2 feet high. In grazing both millet and sudan grass, it is better to graze any one field or portion of a field off completely by stocking heavily, and then allow it a reasonable time to recover, than to allow the stock to be continually picking over it.

Both sudan grass and Japanese millet should be sown with the ordinary grain drill at the rate of from 12 to 15 lb. per acre, although if a good germination were assured 10 lb. per acre would be sufficient. Both are rather difficult crops with which to obtain a good germination and, in most instances, careful preparation of the seed-bed would more than repay the cost of the labour involved. A period of fallow sufficiently long to enable the establishment of a good firm seed-bed covered with a nice loose mulch, would be a definite advantage, especially where the crop is not sown under irrigation. Although these crops frequently are sown without any fertilizer, an application of superphosphate at the rate of 60 lb. to 100 lb. per acre should prove profitable. Shallow sowing is recommended, and where the ground shows signs of caking after sowing, the crust should be broken by means of a harrowing.

A faulty germination is due sometimes to the sowing of poor seed. It is worth while taking some trouble to ensure that the seed sown is true to type and possessed of a good germinating power. In purchasing sudan grass seed it is wise to make sure that it does not carry a mixture of the perennial Johnson grass, as once established this grass is difficult to eradicate.

The time of sowing has an important influence on germination. With both sorghums and millets, germination invariably is faulty

if the seed be sown in a cold soil. Shallow sowing in a warm moist seed-bed aids greatly in securing a satisfactory strike.

Ambercane and imphee are tall-growing sorghums capable of producing a big bulk of fodder particularly well suited to silage-making under conditions that the more fastidious maize plant would not tolerate. Once the crop is established these plants will withstand periods of drought and then make vigorous growth after the first generous rain or application of water. Ambercane is more resistant to dry conditions than imphee, and owing to its more rapid growth is better suited to the production of early feed. It will not tolerate frosts, and should be sown earlier in the season than imphee. It is sufficiently mature to cut for feed in approximately four months after sowing, and owing to the comparative fineness of its stems can be converted into hay.

Imphee is specially valuable for sowing in late districts or for producing a crop designed to carry on well into the winter. Although further growth is prevented by frosting, the leaves and stems do not lose their succulence, and the crop can be left standing in the field without losing its value, well after the advent of frosty weather. Planted about January this crop could be expected to produce feed up till the end of June. Owing to the possibility of sorghum poisoning it should not be grazed until the plants are in flower and the seed head has formed, although it may be cut and fed green at any stage provided the fodder is allowed to lie and wilt in the sun for two or three hours.

The seed of these sorghums should be sown shallowly in moist soil, preferably in drills about 3 feet apart, at the rate of 4 to 5 lb. per acre, although heavier seeding is warranted where the summer rainfall or irrigation is fairly abundant. Fertilizing with superphosphate at the rate of 1 cwt. per acre is recommended.

Only occasionally are sorghums injurious to stock, and ordinary care will prevent any trouble occurring from this cause. The poisonous substance sometimes present gradually lessens as the plant matures and disappears entirely by the time seed is formed. Young sorghum, especially if its growth has been checked through any cause, is dangerous, and should never be fed to stock—the mature crop can be fed with safety. Silage from sorghums is quite harmless.

Tobacco Experiments

(*Continued from page* 540).

Suckering Trials.

A series of ten plots, planted on 24th January, was topped and suckered once. Subsequently five of these were maintained in a suckered condition, and the remaining five were allowed to sucker at will.

The leaf from these plots was not properly matured when it was destroyed by frost on the 24th April, but the produce was picked and weighed green, and the potential cured weight calculated. Results were as follow:—

Weight of Cured Conditioned Leaf in lb. per Acre.

Topped and Suckered Plants.	Topped Plants not kept Suckered.
904 lb.	725 lb.

It will be seen from these results that, in a period of approximately one month, the loss in weight per acre due to allowing sucker growth to accumulate was 180 lb. of cured leaf. If maximum yields are to be maintained in conditions similar to those at Shepparton suckering is essential.

Dairy Farming

Factors that make for Success

By John Robertson, Dairy Supervisor

MANY farmers apparently do not realize what a nervous animal the dairy cow is and the consequent need for kindly handling of the herd. Cows may be unintelligent; if so there is all the more reason for treating them in an intelligent way; patience is better than kicks.

If the farmer is to receive the maximum returns from his labour and the capital invested in his farm and stock, the twice-daily performance of milking the herd and the other necessary shed routine must not impose on the animals any more discomfort than is necessary. There are still among our dairy farmers men who appear to think that the establishment of a dairy farm calls for no greater display of intelligence than the getting together of a certain number of cows regardless of age or condition.

Such owners naturally give no consideration to the rearing or breeding of the animals of the herd. It is a common practice with such to run the herd in one large paddock, the quality of the pastures and the water supply depending on nothing more than Nature's generosity the year round. The cows often are dogged at a gallop from the far corner of the farm to and through boggy entrances and narrow gateways. They are rushed through the milking operations, with no more worthy object than to finish milking before the next-door neighbour.

On many farms the excessive mud of winter and spring becomes the uncontrollable dust of summer and autumn, thus making for a year-round nuisance. The bailing yard should have a well-drained and impervious surface, more especially near the cow shed. Such an improvement will be found to ensure cleaner conditions generally.

Carelessness in management usually associates itself with careless milking, and careless or dirty milking methods are a means of germs—and the most objectionate type of germ at that—entering the milk in excessive numbers. Skin-scurf, hair, dung, dust, dirty udders, unkempt finger nails, dirty hands, and battered or rusty utensils, all contribute their quota of the micro-organisms which are the direct cause of the spoiling process in milk. Too often no special effort is made to cool the cream or to keep it cool, and, of course, premature and extensive souring of the product results. Dirt-befouled walls and posts, dirty leg-ropes, manure-splashed stools and ill-washed milk buckets, the greasy parts of the milk-shed smeared by the hands of the attendants, all contaminate the product, thus affecting its keeping quality and lowering the return paid for it at the factory.

Insufficient thought is given to the financial loss incurred through low butter-fat returns from inadequate feed, or to losses from injuries or accidents, which more frequently occur under careless conditions of management.

Often the ancestry of the bull is unknown; in the absence of herd-recording work the yields of individual cows cannot even be guessed, and the selection of heifer calves is wholly haphazard. Thus three essential factors in the upbuilding of a profitable herd are lost sight of.

In every herd there are natural "boss" cows, that continually disturb and attack their quieter and more timid herd mates, causing them to rush from place to place for safety. The victims escape from one tormentor, only to be caught by another. Considerable herd depreciation occurs every year from these causes. Much of this loss could be avoided at a low cost, by the adoption of the practice of dehorning.

Whips, sticks, and other instruments of torture are sometimes used to force more cows into the milking bails than there is accommodation for. The result is that the herd becomes restless and excited and the bad-tempered cows will gore and rip the flanks and udders of their more timid mates. By upsetting the herd, the yields of the more sensitive animals are apt to

be reduced, as such treatment may cause the animal to "hold" her milk.

New-comers to the industry, who are about to purchase animals, or those who intend to breed a better and more profitable class of dairy cow, would be well advised to consider the proved practices of managing the dairy herd. No better advice can be tendered than to follow the examples set by the leading farmers of one's district. Such men usually are to be found taking an active interest in the district Herd Testing Associations and other movements, the object of which is to improve their efficiency. On these well-managed farms, bail disturbances are rare, despite the fact that the cows are hand-fed and require a longer time in the bails, and satisfactory milk yields result. The peace that prevails makes for greater cleanliness; the cows reach the shed entrance in regular and orderly turn, and milking operations are carried out at the usual times, both morning and evening. Many of the best dairymen complete their morning operations by 8 o'clock, and the cows are to be seen lying down "cudding" long before noon. Under such ideal conditions the cows of the herd—no matter what the breed or breeding may be—can be approached in the yards or paddocks at any time. The owner realizes only too well that any other system of treatment would not be in his best interests, and that any factor likely to cause the unsettling of the stock would be reflected in reduced yields.

Clean Milking—Clipping the udder, flanks, and tail.

With butter-fat at its present low level, it is essential that every effort be directed towards maintaining and increasing the yield. A little could be achieved in this respect by milking the heavy producers last at night and first in the morning. Under ordinary farm conditions, milking three times daily usually does not compensate for the extra trouble involved unless the yield is over 6 gallons per day. There is no doubt, however, that some system of rugging during the cold months helps considerably in maintaining the yield. This is more marked where there is no natural shelter or wind-breaks about the paddocks. Otherwise there is a distinct loss in the food consumed, for some that should go to increase the milk supply will be used to keep the animal's body at normal temperature.

Mr. W. J. Reid's "Brindle." Test yield 1931-32—429 lb. butter-fat.

A Well-managed Farm.

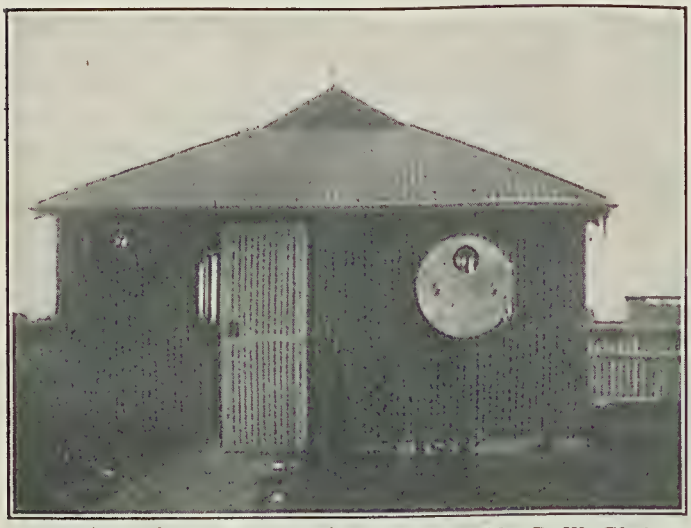
A striking example of a herd and farm managed on these sound lines is that of Mr. W. J. Reid, a member of the Winchelsea District Herd Testing Association. By good management high fertility has been developed, and splendid returns are now being received from this farm. It consists of 94 acres, valued at £12 per acre, and is situated 3 miles from a railway station at "Barwon-vale," Gerangamete. The rainfall is approximately 30 inches, and is well spread over the whole year.

In 1930-31 the herd of 22 averaged 8,200 lb. milk, testing 4.5% and yielding 396 lb. butter-fat. (In the total butter-fat the allowances for junior cows have been included.) The total sum received for cream was £446, approximately £20 for each of the 22 cows in the herd. In 1931-32 18 cows finished their test with 8,470 lb. milk, 4.4 test, and 411 lb. of butter-fat.

Mr. Reid's convenient cow-shed. Note underground tank on left, shutters, and sledge for manure.

The property is at present subdivided into 15 paddocks, and plans are completed for three more; thus a rotational system of grazing can be carried on. Several paddocks can be shut up in the spring, for meadow hay, and last year 30 tons was harvested from 11 acres in one cutting, consisting mainly of rye-grass and subterranean clover. An adequate water system supplies all paddocks. The whole farm was top-dressed with superphosphate at the rate of from 90 to 200 lb. per acre during May, which is later than usual. Mr. Reid intends to purchase a mower so that "clipping" the paddocks inclined to seed early may help to maintain a better and prolonged grazing period.

At present the 20-ton grass hay stack is protected from the weather by sections of galvanized iron, but it is proposed to erect a hay shed, 40 feet by 36 feet by 12 feet at the eaves, handy for this class of fodder storage, and convenient to the cow shed. Mr. Reid's method of feeding pasture hay to his herd is to damp, before it is chaffed, about four days' supply at a time, and the heated material is keenly eaten by the milking herd. The necessity for the oat crop, for conservation, is becoming less and less every year, although 10 tons of oaten hay, well thatched, is now in reserve on a mouse-proof stand. Preference will be given to grass as a material for hay making. Mr. Reid favours a heavy seed mixture; 20 lb. of perennial rye grass, 3 lb. each of cow grass and subterranean clover, 2 lb. white clover and 1 lb. alsyke per acre being sown.



An up-to-date cream room on the farm of Mr. R. W. Christie, Eurack. The 3 ft. verandah is enclosed by trellis-work.

On the river frontages there are excellent strawberry clover pastures, and five paddocks, each about 6 acres in area, are sown to Japanese millet, which provides supplies of fodder for the early summer and autumn.

Ample feed is made available at all times whether the cows are in full milk or not. Usually, as many dry cows as possible are put out to agistment during the winter. This year 45 head were placed on a 30-acre paddock for two months at 1/6 per head per week. Mr. Reid considers that the agistment cost is repaid during the first month after the cows freshen. The change from the coast area on to the high

Mr. A. J. Hunter's 3-year-old Ayrshire heifer. Yield 407 lb. butter-fat.

land appears to be good practice, for the herd milks well from the start of the season. A suitable bull paddock controls the pure-bred Jersey sire, "Adonis of Greenwood," who is from "Dinah of Greenwood," who, under Government Test, produced 421 lb. of butter-fat as a 3-year-old.

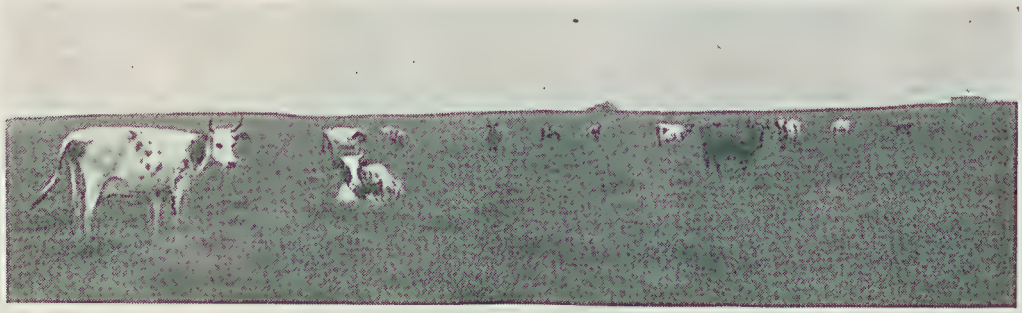
The milking shed, gable-roof type, 44 feet by 14 feet wide, with galvanized iron roof, walls, and sides, consisting of 4 double bails of the walk-through design, is kept particularly clean inside and outside. At a cost of approximately £10 for labour and materials, a 3,500-gallon underground tank has been sunk, and this is filled from the shed roof. The water from this tank is used mainly for flushing the floors of the separator room, cow-shed, receiving-yard, and drains. Another benefit of the supply is that water about 50° F. can be pumped to a 30-gallon tank suspended from the roof above the separator vat. During the warm weather this water is connected to the cream cooler; the cream is effectively cooled, and the unused water is drained back to the underground tank. The cream is removed immediately to a well-ventilated storage room, but it is not added to that of previous separatings until about the time of the following milkings, when both lots are equal in temperature. The cream is then stirred with a well-tinned cream plunger, and the cans are covered with a clean muslin cloth. The storage room is protected from the sun by suitable shady trees.

The separator vat is suspended from the rafters; thus a solid block easily kept clean is the only obstruction on the floor. Draining racks and shelves are attached to the wall. Mr. Reid intends purchasing a tinned cover for his 60-gallon milk vat, for the exclusion of flies and dust. A place for the milk strainer to fit into will be included; this will help to maintain the temperature of the milk, and so add to the efficient working of the separator. The separator is tested periodically, thus ensuring a control over loss in the separated milk. Nails are provided for hanging up the seamless buckets, away from all traffic, &c., when they are not in use. The utensils are in good order, and when milking operations are completed, are well washed and scalded. In the milking bails clean udder cloths and scissors are kept within easy reach of the milkers.

Behind each division of the cow shed, swinging, galvanized iron shutters are hung from the roof. These are adjustable by handles from the inside, to shut out either the sun or the rain as need arises, making for comfort for the milkers. These shutters when swinging have a clearance of 5 feet from the ground, thus giving ample room for the cows to walk under them into the bails. The rear bail-posts support the roof. The feeders are made of cylindrical petrol-drums divided longways, and so arranged as to hold two kerosene tins of food. They have well-fitting sides to avoid wasteful spilling, and thus obviate the necessity for sweeping up feed. A low-wheeled box with about 6 inches clearance, and a capacity for sufficient feed for one day's supply, is easily manipulated behind the bails. The posts and rails of each partition are tarred 2 feet from the ground, and the rest of the woodwork whitewashed when required. Each exit door is 3 feet wide by 5 feet high, and opened by an 8-foot handle, with nicks provided for controlling purposes.

A simple outside bail erected in a corner of the bricked receiving yard can be used when sick animals are to be treated. A milk fever outfit and useful stock remedies are kept in a convenient corner of the cow shed. Hard bricks laid across the bail-floor, properly grouted with cement, make a floor that is non-absorbent and easily cleaned, without being slippery. The drainage is well extended from the milk-shed and yards, and a sledge is used to remove the manure regularly. This useful conveyance is placed outside the 40 feet by 25 feet impervious receiving yard.

Mr. Reid's efforts are being directed to permanent improvements. The pig sties are served by a gravitation tram line, which conveys the skim milk in petrol drums, when



A contented Herd.

separating is finished. No sour milk is left near the milking-shed or separator-room at any time. Neither fowls nor animals of any description are permitted to be a nuisance about such well-kept dairy premises. Firewood is abundant and easily obtained. A 10-gallon copper provides an ample hot-water supply. The copper stand is made from a petrol drum, and renders a satisfactory service for this purpose. A good-fitting lid helps to secure quick steaming.

Mr. Reid takes a great interest in his work. This is undoubtedly one of the main reasons for his early success. The herd at present is of mixed breeding, but this enthusiastic supporter of Herd Testing has a strong liking for the Jersey breed. His intention is to introduce pure-bred registered females, as opportunity occurs and as funds permit. A sufficient fodder reserve for a year's supply is aimed at; anything above such amount is considered by Mr. Reid as unnecessary.

Last year Mr. Reid scored so well in the Dairy Farm Competition, No. 6 Zone, that he has been encouraged to improve the appearance of his home. Just now, attention is being given to the layout of the garden and the orchard, which are surrounded by shelter hedges.

Anyone interested in commercial dairying, desirous of seeing a well-conducted farm, will not be disappointed at travelling some distance to look around this attractive property, which is about 6 miles from Forrest, on the Colac Road.

Starting young—Junior Stock Clubs help to make successful Dairy Farmers.

Maize Varieties

Tests at Orbost

A YIELD of 80 bushels per acre was the highest recorded in the maize variety trials conducted in the Orbost district by the Department of Agriculture. These trials, which are conducted under the auspices of the Orbost Maize Growers' Association, are being carried out on the farm of Mr. G. H. D. Russell at Bete Bolong, and it was Mr. Russell's entry of "Improved Reid's" that gave the best return. The average yield of the nineteen strains included in the trial was 65.3 bushels per acre. In the 1931-32 season the highest yielding strain returned 120 bushels per acre, while all strains tested averaged over 100 bushels per acre.

Last season's yields, however, are regarded as very satisfactory, in view of the fact that the rainfall during the growing period of the crop, i.e., from October to May, was 827 points less than the average fall over these months, the departure from normal during the three critical months of February, March, and April totalling 484 points. The rainfall during the growing period and the average falls for those months are as follow:—

—	October.	November.	December.	January.	February.	March.	April.	May.
1932-33 ..	288	111	228	156	28	172	53	205
Average for 48 Years ..	310	221	265	268	229	250	260	264

In addition to suffering from droughty conditions during the growing season, many district crops were severely cut by exceptionally early frosts. No fertilizer has been applied to these plots, despite the fact that the land on which they are situated has been devoted to maize culture for many years. The yields obtained last year, in spite of a particularly dry season, are a tribute to the fertility of the Orbost flats and the quality of the strains of maize generally used in the district.

There still is, however, a large difference (28 bushels per acre) between the highest and lowest yielding strains tested. In this respect it is of interest to point out that the average yield of the check plots was slightly higher than the average yield of the varieties, which indicates that on soils similar to those on Mr. Russell's property, some of the strains tested are not such prolific yielders as was expected.

TABLE I.—RESULTS OF VARIETY TEST, 1932-33.
Seed sown in rows 3 feet apart on November 8th.

Grower.	Yield.	Yield of Check Plot.	Increase or Decrease over Check.	
	Bushels per Acre.	Bushels per Acre.		
G. H. D. Russell (Reid's Improved)	80·8	68·5	Inc.	12·3
J. W. Lynn (Golden King)	72·5	63·7		8·8
Aitken Bros. (Red Hogan)	72·7	68·9		3·8
J. H. Nixon (Krugo Corn)	71·8	68·1		3·7
Fisher Bros	67·8	64·8		3·0
Ah Chow (No. 2) ..	59·2	60·0	Dec.	0·8
J. Lynn (Kruge Corn)	65·7	66·8	,,	1·1
J. W. Lynn (Funks) ..	69·6	71·4	..	1·8
Ah Chow (No. 1) ..	65·4	67·9	,,	2·5
J. Irvine (Funks) ..	60·6	63·6	,,	3·0
W. Cumings (Silvermine)	56·4	59·7	,,	3·3
Johnston (White Maize)	65·6	70·4	,,	4·8
K. Lynn (Cornplanter)	58·6	63·4	,,	4·8
G. H. D. Russell (Canadian Pride)	69·4	74·5	,,	5·1
K. Lynn (Funks Y.D.)	62·0	67·9	,,	5·9
W. Cummings (Reids)	67·9	76·4	,,	8·5
H. Powell (B.C. White)	66·1	76·1	,,	10·0
J. Irvine (Silvermine)..	58·7	72·2	,,	13·5
C. Pettifer	51·0	66·7	,,	15·7

Over the six years' period during which the variety trials have been conducted, J. W. Lynn's strain of Funk's Yellow Dent and G. H. D. Russell's strain of Reid's Improved

Yellow Dent have performed well and consistently. J. H. Nixon's strain of Kruge Corn, Aitken Bros.' Red Hogan, and J. W. Lynn's Golden King have given good yields during the last three years.

From the results so far obtained, it would appear that under conditions similar to those at Bete Bolong, Orbost, the varieties, Reid's Improved Yellow Dent and Funk's Yellow Dent, have equal yielding potentialities; with Kruge Corn, Golden King, and Red Hogan following in that order.

Owing to the readiness with which different varieties of maize cross fertilize, however, the yielding ability of any one of these varieties can be maintained only by paying careful attention to the selection of cobs for seed in the field. The yields are shown in Table I.

Manurial Tests.

Prior to 1931-32, the manurial tests were carried out on fertile flats similar to those on which the variety plots are situated. On these plots superphosphate and sulphate of ammonia, either singly or in combination, failed to give any appreciable increase in yield. In 1931-32 the plots were transferred to higher and lighter land on the property of Mr. J. W. Lynn, the plot lay-out being similar to that employed in previous years.

The plots were sown on 8th November in check rows 3 feet apart. Where superphosphate was used, it was sown with the seed, but the nitrogenous manures were applied as a top-dressing after the maize had germinated.

In the early stages of growth, the manured plots showed to decided advantage over the unmanured, but this early promise was not maintained, the "no manure" plots eventually yielding as well as those that had been treated with fertilizer. The results are set out in Table II.

Table II.—Maize Manurial Trials.

Manurial Dressing per Acre.	Yield, Average of Six Plots.	Yield of Check Plots, Average of Six Unmanured Plots.	Increase or Decrease over Check.
	Bushels per Acre.	Bushels per Acre.	Bushels per Acre.
Super., 1 cwt. ..	52·5	54·0	— 1·5
Super., 2 cwt. ..	56·5	53·5	+ 3·0
Super., 1 cwt., amm. sulph., 1 cwt. ..	50·75	51·2	— 0·4
Blood and bone, 1 cwt.	50·1	50·0	— 0·1

Books Reviewed

Empire Journal of Experimental Agriculture (Clarendon Press, Oxford. Published quarterly. Price, 7s. 6d. per copy).

The new *Empire Journal of Experimental Agriculture*, published by Mr. Humphrey Milford, Clarendon Press, Oxford, is a useful addition to the existing literature dealing with agricultural research work, and should enable both research workers and extension officers to keep in touch with the latest developments in agricultural practice throughout the Empire. The journal, the editorial board of which includes representatives from all sections of the Empire, should cover a wide range of agricultural topics, and the first two numbers indicate that many matters of immediate practical interest will be discussed in such a manner that the busy worker can readily ascertain the nature and results of the experiments recorded. Previously most agricultural publications have catered either for the needs of the farmer or for the investigator working on fundamental problems, and, as a consequence, articles have tended either towards general information only, or have become too technical for the average reader. In this journal, a happy compromise appears to have been effected, and by its means research workers with a limited time at their disposal should be enabled to obtain a concise yet sound description of the most recent results obtained by other workers throughout the Empire.

The Weekly Times Farmers Handbook. The "Herald" Press, Melbourne. 2s. 6d.

This handy-sized, cloth-covered book contains much valuable advice for the primary producer. Liberally illustrated with photographs and diagrams, it deals with the management of all farm animals, whether in sickness or in health, and contains prescriptions for the treatment of most stock ailments. Also included are chapters and diagrams dealing with the making of a pig-sty and wool-press, illustrating the method of cutting up a bullock, and showing how to drive a chaff-cutter with a motor car, &c. The material for this book has been selected with the utmost care from the answers to questions published in "The Farmers' Information Bureau" of the *Weekly Times*.

Feeding Grain to Pigs

Results of Tests

By A. J. Gill, Senior Herd Tester.

FOR success in pig-raising the two primary essentials are that the right type of pigs be bred, and that they be fed correctly. Each of these factors is as important as the other, but in this article it is proposed to deal with feeding only. The term "correct feeding" usually implies the feeding of a balanced food, i.e., one that contains the necessary quantities of flesh-forming food or proteins, and of the heat and energy-producing constituents or carbo-hydrates in the correct proportion.

Pigs grazing on dried peas on the farm of Mr. R. Purnell, Moriac.

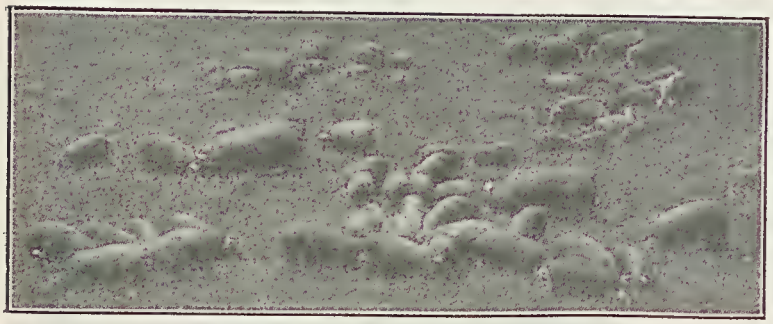
It is a peculiar fact, however, that while certain foods may form a correctly-balanced ration, and fatten pigs rapidly, they will produce an inferior pork or bacon. In feeding pigs, therefore, we have to consider not only which foods are the most economical for producing bacon, but also which will produce pork and bacon of a desirable quality. Certain foods give the required firmness, colour, and flavour to the flesh, while others produce a soft, flabby, inferior flesh.

Of the grains barley may be classed as the best food for producing first class pork and bacon, with wheat and oats next in order. However, because of its large percentage of hull, oats is not a suitable food for very young pigs, and it is advisable that this grain be kept out of the ration until the pigs are twelve weeks old. Wheat should not be ground fine, as it has a tendency to become doughy. Peas are valuable for fattening, but give best results when fed in conjunction with other grains. Fed alone, peas produce a very hard lean bacon. In feeding peas the best results will be obtained if they are mixed with other grains in the proportion of one part of peas to three of the other grains used.

Because of its fineness pollard is a valuable food for young pigs and weaners, but pigs fattened solely on pollard, or pollard and milk, do not produce a firm flesh. It is necessary, therefore, to mix grain with the pollard and, as the pigs get older, to increase the proportion of grain to pollard and fatten off with a mixture of 60 per cent. grain and 40 per cent. pollard.

Maize, as a grain, though relished by pigs, produces an inferior flesh and fat, and for that reason buyers are never anxious to take pigs from districts where maize is grown. However, where maize is produced, barley also can be grown, and by finishing the pigs off for the last three weeks on a large percentage of barley, the quality of meat can be improved, and the market value raised probably by from 1d. to 2d. per lb. We have fattened pigs on a mixture of 50 per cent. maize and 50 per cent. of other grain and produced bacon of fair quality. However, I would not advise the use of more than 40 per cent. of maize, and a lesser quantity would be advantageous. Beans fed in large quantities produce a very inferior flesh and should not form more than 15 per cent. of a grain mixture.

Green lucerne provides valuable pasture, but when fed in very large quantities results in inferior bacon, and fattening pigs grazing on lucerne should always have access to grain such



Pigs grazing on Lucerne.

as barley, wheat, or oats, or a mixture. If the bacon is found to be not up to the standard, the pigs should be taken off the lucerne three weeks prior to marketing.

Refuse from restaurants, fed alone, will produce an inferior flesh. This refuse should be boiled, allowed to cool, and the fat skimmed off. This excess fat is of very little use to the pig and may cause scouring. Usually, restaurant refuse is high in starchy matter and fat content, but lacking in protein and, for the best results, grain and meat meal should be fed in conjunction. Refuse from restaurants varies in value, but on an average 20 lb. should produce 1 lb. live weight of pork.

Offal from slaughter yards should always be cooked before feeding. Fed alone it will not produce first class pork. It is rich in protein and will give good results and prove profitable when used in conjunction with grain.

Potatoes, which are cheap this year, are improved by cooking. From 4 to 5 lb. of potatoes, 1 lb. of grain, and a gallon of skim milk form a balanced allowance. Many people, however, are feeding potatoes alone and do not wish to purchase grain. However, we would not advise more than 6 to 7 lb. to the gallon of skim milk when fattening. Boil the potatoes, discard the water, and mix with the milk. This will not produce first quality pork or bacon.

Bran is fed to sows suckling litters, its chief value being in its laxative properties. Usually 2 lb. a day, fed in conjunction with other feed, is sufficient for a sow.

In recent years a number of feeding experiments have been carried out on the farm of Mr. R. Purnell, at Moriac, the object being to ascertain the most economical methods of rearing and fattening pigs.

One of the first experiments was the feeding of lucerne chaff—this, however, proved too bulky and fibrous. It was then gristed and fed but, though slightly better results were obtained, it was not a success and is not advised as a fattening food. Malt combings have been tried, but cannot be recommended as a pig food. It is a peculiarity of the pig that it can digest scarcely any fibre.

Grazing on green peas when the grain had formed in the pod, and reached the stage when they are used as a vegetable, was tried, but this also was not successful. The pigs chewed and rejected the pods, eating only the peas. They did not make any noticeable improvement until the pods dried and the grain had hardened.

Most of the tests were carried out in connexion with the open air method, allowing the pigs to graze on pasture with automatic grain feeders. Our first experiments were carried out with barley, pollard, meat meal, and linseed meal—10 per cent. meat meal and 8 per cent. linseed meal being used. The food was balanced to contain approximately 1 lb. of protein for every 4½ lb. of carbo-hydrates, and the result invariably obtained was 1 lb. of pork for every 3½ lb. of food eaten. This was a very satisfactory figure.

It was then determined to try a free choice test to ascertain the amount of protein-rich foods the animals would eat if given free access to them. Mr. Purnell had three compartments made in the feeders. Mixed meal was put in one, linseed meal in the second, and meat meal in the third. As a result of experience gained the linseed meal has since been discarded when the pigs are grazing on green grass, and now only two compartments are used—one for the grain and the other for meat meal. Some very interesting results were obtained. For instance, pigs on young leafy pasture ate scarcely any meat meal, but as the grass became more fibrous and running out into stem, more meat meal was consumed. In the former case there was a saving of about 10s. per head in the fattening of the pigs, and the test indicated that, with a nice growth of clover and young leafy pasture, meat meal may be dispensed with completely, thus substantially reducing the cost of fattening.

Feeding experiments were carried out also in sties, the pigs being fed the grain mixture

and water. The first test of this kind was made in connexion with a claim that a certain seaweed, fed with grain, would add materially to the feeding value. However, the pigs receiving the seaweed did not make the same progress as those not receiving it.

When wheat prices dropped so severely a feeding experiment was carried out to determine the feeding values of wheat. Pigs in one sty were fed on wheat and meat meal, those in the other receiving two-thirds barley, one-third wheat, and meat meal. The meat meal was placed in separate hoppers to the grain. The pigs were allowed an unlimited supply of water but no pasture. Four pigs from the same litter were placed in each sty. At the commencement of the test the total weight of the four on barley and wheat was 214 lb., an average of 53½ lb., and of those on wheat 215 lb., an average of 53¾ lb. In 90 days from the first weighing, the pigs on wheat and barley weighed 755 lb., while those fed on wheat weighed 655 lb.—just 100 lb. less than those on the mixed grain. Those on wheat and barley ate 384 lb. more feed in the 90 days. They made 1 lb. of pork for every 4.24 lb. of food, and the food consumed daily averaged 6.38 lb. per head.

The pigs on wheat ate 4.34 lb. of food for every 1 lb. of pork gained (1 lb. more food than the others), and they took only 5.28 lb. of food daily, or 1.1 lb. less than those on mixed grain. An interesting feature was the fact that the pigs on barley and wheat consumed 8 per cent. meat meal, those on wheat 6 per cent. The cost of feed per lb. of pork was practically the same in each case, approximately 2½d. per lb. The gain in favour of the mixed grain was 100 lb., or 25 lb. more pork per head in the same time. When killed and dressed those fed on barley and wheat showed a firmer fat than those on wheat only.

A pen of four pigs, first cross between Large and Middle Whites, made an average gain of 1 lb. of pork for every 3.77 lb. of food consumed, no pasture or milk being fed, while a pen of three-quarter-bred Middle York pigs gave an average of 1 lb. gain for slightly more than 4 lb. of food. While one trial cannot be taken as an infallible proof as to the superiority of the first cross as economical pigs, it does indicate the value of testing our sows. Some pigs will fatten more quickly and more economically than others, but to ascertain these strains we must test and keep records.

Some experiments, the objects of which were to determine the value, as a pig food, of raisins rejected by the packing companies have been carried out on the farm of Mr. P. Byrne, at Woorinen. A number of pigs in sties were fed on raisins with 10 per cent. of meat meal added. A liberal allowance of water was given, but no pasture or other food. After some time on raisins the food was changed, pollard and meat meal being fed, and the tests showed that raisins had only half the feeding value of the pollard. Further experiments carried out in feeding raisins in conjunction with grain or pollard indicated in each case that raisins saved approximately half their weight in grain. It took from 7¾ lb. to 8 lb. of raisins to make 1 lb. of pork. Raisins, however, proved quite a useful food for sows on pasture.

An interesting feature of these experiments was the feeding value of the pasture. In the more southern parts of Victoria pigs running on pasture required 3½ lb. of grain for each 1 lb. of pork produced. At Woorinen, on the other hand, slightly more than 2 lb. of grain gave 1 lb. gain in weight.

On Mrs. Nicholson's farm, at Berwick, experiments in the feeding of grain and a little milk to pigs on pasture have been carried out for some time. Thoughout the last two years, even though prices have been low, Mrs. Nicholson has shown a profit on each lot of pigs fattened in this way. The amount of grain required for each 1 lb. gain was 3.66 lb.

Feeding Hints.

Grain for pigs should always be gristed. All grain except wheat may be gristed fine. Molasses is not used by many breeders. Those who do use it should not feed more than 10 per cent. Do not feed milk that has been allowed to putrify. Sour milk is no better than sweet. Do not feed sour milk one day and sweet the next. Remember that, as a pig gets older, he requires a broader ration. One should feed 3 lb. of grain to one gallon of skim milk to a pig at eight weeks old; 3½ lb. grain at 10 weeks; 4 lb. at twelve weeks; 4½ lb. at fourteen weeks; and 5 lb. to the gallon of skim milk at sixteen weeks; and fatten off on the latter amount.

A good grain mixture for bacon pigs would be 25 lb. peas and 75 lb. of barley. Always give pigs good, clean drinking water. Green pasture not only cuts down feeding costs, but also keeps pigs in good health.

Native Insect Pests of the Orchard and Garden

By C. French, Biologist; and R. T. M. Pescott, M.Agr.Sc., Entomologist

FOR many years a large number of our native insects have partially deserted their native food-stuffs and turned their attention to economic plants. The reason for this, in some cases, is obscure. In the majority of cases, however, the cause is probably one of the following:—

(*a*) The removal of the native plants on which these insects breed causes them to seek elsewhere their means of life.

(*b*) The removal of one of the factors that is providing the "balance" causes an enormous increase in the number of insects. Their native food then is not sufficient to meet their demands, and consequently other food materials must be found in order that these insects may live. An example of this is the decrease in the number of our native insectivorous birds, which previously kept quite a large number of native insects in check. The English starling, the Indian minah, and the common sparrow, introduced into this country many years ago, follow man right to the farthest edge of cultivation, at the same time driving the native insect-feeding birds from their nesting places, and thus removing one of the factors maintaining the "balance."

In earlier numbers of this Journal (Vol. XXIV., Parts 7, 8, and 10) some of the native insects were dealt with, and it is the intention of this and subsequent articles to continue the discussion on our native insects.

The Harlequin Bug.

(*Dindymus versicolor* Schon.)

The Harlequin Bug belongs to the family *Pyrrhocoridae*, commonly spoken of as the true fruit bugs. It is one of the native insects whose attacks on cultivated plants, particularly in recent years, have been very serious. Very little is known of the food habits of this insect when in its native state, but it is certain that very little damage was done when in that condition. It is only since it has attacked cultivated plants, providing as they do a wealth of suitable food materials, that the insect has assumed epidemic numbers, and caused the large amount of damage that is now evident every year.

One of the favourite breeding places of this insect at the present time is the introduced weed Marsh Mallow (*Malva rotundifolia*), while the common garden hollyhock is also found very suitable. For many years numerous fruit trees have been attacked, as early as in 1889 an outbreak being reported on apples at Myrniong. Since then other trees attacked are pears, almonds, apricots, and peaches, whilst grapes are severely attacked. Numerous flower and vegetable plants also are attacked, the most severely affected being tomatoes, potatoes, lettuce, dahlias, chrysanthemums, marigolds, and hollyhocks.

Life History.—The eggs are laid during the late summer months amongst rubbish, under logs and stones, and in the cracks and crevices of old posts and rails. During the early summer, they are laid on the foliage of the plant attacked, usually close to the ground level. On hatching, no true larva is formed as in the majority of insects, but a very small bug emerges, which by passing through a series of moults reaches the adult stage in about three to four weeks. The small bugs are

The Harlequin Bug. 2, 3 and 4, Adult Female; 5, Larva about Two-thirds Grown; 6, Section of Fruit showing damage.

quite immature and wingless, while the adult insects have wings. When about half grown, the bugs usually are more highly coloured than when in the adult stage.

The adult Harlequin Bug is about one-half inch in length, with the upper surface of the body brightly marked out into red and black triangles, whilst the predominating colour underneath is green.

As members of this particular group are sucking insects, the damage done to fruit is caused in the following way. By means of a sharp proboscis which is inserted in the fruit, sap is sucked out and the fruit takes on a spotted appearance, and in many cases shows a slight wilting tendency. Almonds are attacked when the developing fruits are soft and green, and very severe gumming of the fruit occurs in these cases. On garden plants the young succulent tips are first attacked, finally the whole tip dying out and preventing normal growth of the plant concerned. One remarkable case that came under our notice lately was where adult Harlequin Bugs were seen actually feeding on the dead larvae of the Painted Apple Moth (*Teia anartoides*).

Control.—On account of the sucking nature of the mouth parts of this insect, stomach poisons such as arsenate of lead are useless. It is necessary to use contact sprays.

Nicotine sulphate 1 oz. to 5 gallons of water to which a little soft soap has been added, will prove very effective, particularly when the bugs are in the immature stage. Benzole emulsion, 1 lb. to 5 gallons, will also give satisfactory results. Clensel, one of the more recent proprietary liquid insecticides, has given very satisfactory results when used on Harlequin Bugs.

The Holy or Cross Bug.

(*Mictis profana* Fabr.)

The Holy or Cross Bug belongs to the family *Coreidae* or the Gum Tree Bugs. The native food plants of this insect are all species of Acacia, particularly *A. longifolia,* the Coast Wattle, and *A. decurrens,* the Early Black Wattle, whilst, in many parts, Eucalypts form their chief food source.

They have now, in many cases, left their native food and become a serious pest in citrus groves. The main damage done is to the young shoots, the sap of which is sucked, giving the wood a burned appearance and destroying tree growth; in many cases, the whole tree itself dies back to the old wood, causing great disfigurement to the trees, and consequent loss of crop.

Life History.—The eggs of this bug are deposited mainly on the food plants, although, as is the case with the Harlequin and Rutherglen Bugs, the eggs may be laid in debris, cracks and crevices in fences, &c. These eggs hatch to a small wingless bug, which, on passing through a series of moults, reaches the adult stage. Both the young and adult stages feed on the twigs together, but when disturbed the latter fly away, while the former hide among the leaves. Frequently they drop to the ground, hiding among debris.

The Holy or Cross Bug.

(Mictis profana.)

The greatest damage is done when a group of these insects work on the one shoot at the same time. This shoot is soon killed, and the tree then throws out new shoots, which are in turn attacked and destroyed. They apparently attack only the tender portions of the tree, being unable, seemingly, to penetrate the hard tissue of the old and matured wood.

Control.—Contact sprays, such as nicotine sulphate, benzole emulsion, and Clensel, are recommended as for Harlequin Bugs.

Rutherglen Bug.

(*Nysius vinitor* Berg.)

The Rutherglen Bug belongs to the family *Lygaeidae,* popularly spoken of as Chinch Bugs. This insect breeds, in its native state, in grass lands, and during the summer swarms over all kinds of field crops and fruit trees in countless millions, sucking the sap of both foliage and fruit. The principal plants attacked are peaches, apricots, strawberries,

raspberries and other berries, grapes, tomatoes, potatoes, silver beet, and broad beans.

Life History.—The eggs of this insect are laid on both native plants and introduced weeds, particularly the Cudweed (*Gnaphalium*) and the Sow Thistle (*Sonchus oleraceus*). These eggs hatch to a small bug, which after a period of five moults turns to the adult bug. The time necessary for complete development is usually about three to four weeks. The adult insects are small, under one-sixth of an inch in length, dull-brown to grey in colour, with silvery-grey wings. They are extremely active and can fly readily.

The Rutherglen Bug. 2 and 3, Under and Upper Views of Perfect Insect (Magnified); 4, Head Magnified; and 5, Adult Insect, slightly Magnified.

The actual damage to cultivated plants is usually the work of the adults, the development of the bug apparently being completed on weeds before the adult invasions take place. On succulent plants such as potatoes and tomatoes the terminal shoots are affected most, and later any part of the plant may be attacked until the plant is actually killed. On fruit trees the fruits themselves are attacked and completely ruined.

Control Measures.—Control measures recommended by various institutions and organizations are legion, but summarizing them they consist of two methods: (*a*) cultural, and (*b*) chemical. The cultural methods consist in the main of clean cultivation throughout the latter part of winter and in the spring. This assists in destroying weeds on which the young bugs are developing. The chemical methods are: (*a*) the use of smudge fires, and (*b*) the use of spray materials. Smudge fires, and particularly those in which sulphur is incorporated, have proved very satisfactory in driving the bugs away from the trees. Spraying methods consist of the use of nicotine sulphate and benzole or kerosene emulsions as a contact spray when the bugs are actually on the trees. A phenyle spray has also been used with much success. This is prepared as follows:—Take 1 quart of phenyle, 3 lb. of washing soda, 1 bar of yellow soap, and 40 gallons of water. Shred the soap and dissolve it in hot water, to which the other ingredients should be added and the mixture made up to 40 gallons. In many cases where weeds are allowed to grow these are sprayed with a poison which destroys the young bugs in their immature stage. Other methods consist of dusting the main branches and trunk of the trees with lime after spraying or dislodging the insects by shaking. This prevents the insects from climbing up the trees.

Orchard and Garden Notes

By Edward E. Pescott, F.L.S.

Single Azalea.

The Flower Garden.

IN cool climates, Azaleas have finished flowering, and Rhododendrons are at their best. To ensure ample flowering for next season, these shrubs should be given a good top-dressing of sheep or cow manure, or of old leaves or leaf mould, to ensure a good supply of plant food. During the dry summer season, particularly on any hot windy day, these plants should be well watered, as, being surface rooters, they dry out quickly.

The old-fashioned Zinnia is increasing in popularity as a summer annual, especially now that the new bright colours are appearing.

Double Azalea.

The latest additions to the family are known as "Lilliput" Zinnias. These are miniature-flowered Zinnias, with flowers a little over an inch across, very compact in habit, and free flowering. The new Zinnia is a welcome addition to summer gardens, and, being hardy, should be planted freely.

Dahlias should be planted out at the end of the month. The old tubers which were lifted last autumn should be cut up, leaving a piece of tuber with a shoot attached. The soil should be well dug, incorporating into it a good manure supply; green manure also may be added. The tuber should be planted with the growth just at soil level, and watered in. If stakes are inserted before planting, injury of the tuber is avoided.

The Vegetable Garden.

After manuring the beds, digging in both animal and green manure, seedlings of melon, cucumber, marrow, squash, pumpkin, and similar vegetables should be planted out. If not planted in rows (double rows are preferred), the seedlings should be set out in groups of three or four, planting them from 9 to 12 inches apart. A cool day or an evening should be selected for transplanting. The roots should be disturbed as little as possible. Water well after planting and all through the season.

When the runners have grown to about 2 feet, the tips should be pinched back so as to force them into branching and lateral growths, which produce the best fruit crops.

For quick salading, mustard and cress should be sown. If a new free sandy seed bed be prepared, in a sunny spot, the first crop will be ready for cutting in ten or twelve days from sowing. The bed should be watered well after cutting, to induce a new growth.

Radish seed should be sown in a similar free soil, and watered well. If well fed and watered the crop should be ready for pulling in four weeks or less.

Lettuce should be planted in a very rich friable soil, and watered heavily during the hot weather.

The Orchard.

The problem of spray residue on apples is perhaps the most acute one that has yet been experienced by growers, and it may yet be necessary to find some other spray programme than that at present in vogue. The spray programme as advised this year by the University of Idaho may be worth studying in Victoria. This spray consists of 2 lb. of arsenate of lead to 100 gallons of water, with an added gallon of fish or mineral oil emulsion. Here any of the good brands of white oils would suit. For the latter spray a solution of one-half pint of nicotine sulphate and 1 gallon of oil in 100 gallons of water is recommended. The aim of the oil and nicotine sulphate is to kill the eggs.

A spray of 3 lb. of calcium arsenate and 1 gallon of oil emulsion to 100 gallons of water has been used with very fair success; but, although this will not leave a serious residue, it is less effective, and may burn the foliage.

Banding of all trees with treated corrugated bands is advised. This latter work is now a recognized part of all Codling moth programme work in America.

Christmas Mails for Oversea

The postal authorities invite attention to the fact that the time has arrived to prepare Christmas gifts and greetings for despatch overseas to relatives and friends in the United Kingdom and Europe. To ensure delivery before Christmas, parcels should be posted in ample time to catch the mail per *Orontes,* closing in Melbourne at noon on the 13th November, 1933.

The R.M.S. *Orontes* is due to depart from Melbourne on 14th November, 1933, and the following are detailed particulars in regard to the despatch by this vessel:—

	Close Melbourne.
Parcels	Noon, 13th Nov.
Newspapers (United Kingdom All Sea Route) ...	Noon, 13th Nov.
Newspapers, endorsed "via France," prepaid at 4 ounces 1d. for despatch via Adelaide and Toulon	10 a.m. 15th Nov.
Small Packets, to be forwarded overland to connect with mail steamer at Adelaide	12.30 p.m., 15th Nov.
Letters, to be forwarded overland to connect with mail steamer at Adelaide (Registered articles, 1 hour earlier.)	1.30 p.m., 15th Nov.

	Close Melbourne.
Small Packets, to be forwarded overland to connect with mail steamer at Fremantle	12.30 p.m., 16th Nov.
Letters, to be forwarded overland to connect with mail steamer at Fremantle ... ... (Registered articles, 1 hour earlier.)	1.30 p.m., 16th Nov.

NOTE.—Letters by this steamer will reach destinations about 16th December. Parcels and Newspapers (all sea route) are due in London on 21st December.

Air Mail—

For transmission by "Karachi-London Air Mail"—Closes Melbourne at 2.40 p.m., 16th November; mails due London, 11th December.

"By Adelaide to Perth" or "By Australian and Karachi-London Air Mails"—Closes Melbourne at 2.40 p.m., 17th November; Karachi-London Air Mail due London, 11th December; by Adelaide-Perth Air Mail only, due London, 16th December.

The Department desires to emphasize that, as in the case of parcels, the senders of small packets are required to fill in a declaration form indicating the nature and value of the contents, and that both parcels and small packets must be posted by handing them in over the counter.

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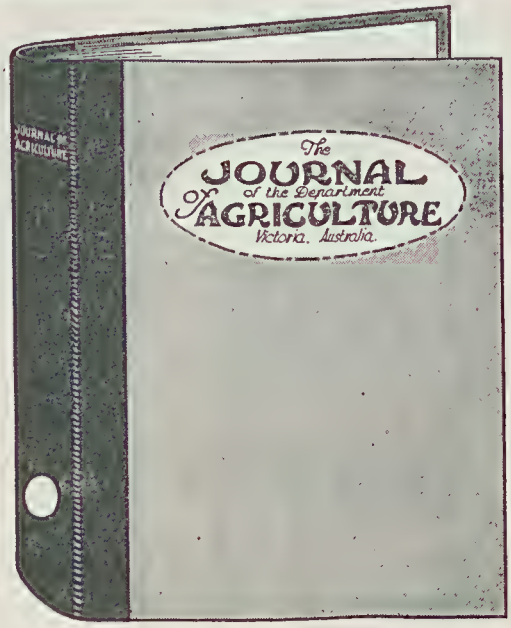

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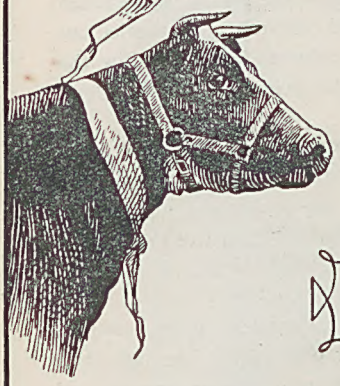

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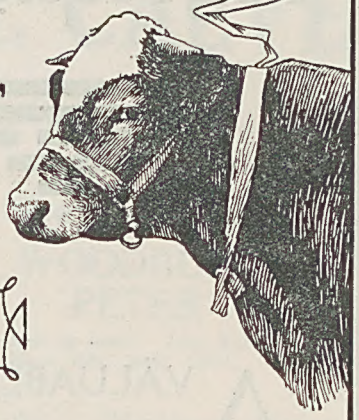

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		lb.	%	lb.	
1927-28	14	9,177	3·67	336·85	399·21
1928-29	10	13,644	3·41	465·24	512·74
1929-30	10	11,831	3·40	399·45	456·95
1930-31	13	12,763	3·43	431·92	500·01
1931-32	10	10,116	3·69	369·00	417·00*
1932-33	10	10,512	3·65	378·53	434·53*
1933-34†	8	11,835	3·55	414·84	496·34*
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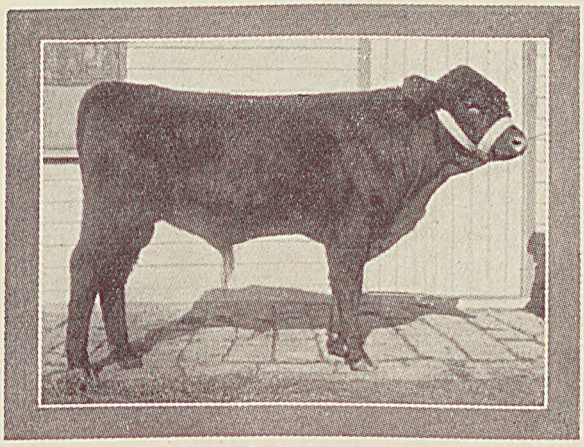

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Dam : Marsden Mindful 39913. Imp. (AA Vol. 7)

(The accompanying photograph of Woodburn Peter Pan was taken at 11 months old.)

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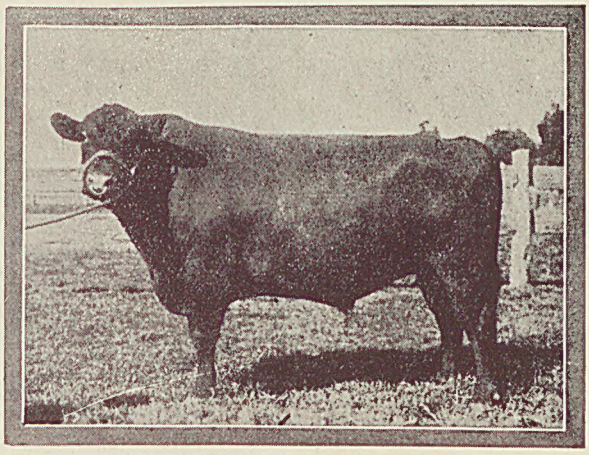

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